UNIVERSITY OF CALIFORNIA.

BIENNIAL REPORT

OF THE

PRESIDENT OF THE UNIVERSITY

ON BEHALF OF THE BOARD OF REGENTS,

TO

HIS EXCELLENCY THE GOVERNOR OF THE STATE.

1890.—1900

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REPORT.

To his Excellency R. W. Waterman, *Governor of the State of California:*

Sir: In accordance with the provisions of the Political Code, I have the honor to present the report of the Regents on the progress, condition, and wants of the University of California during the past two years. I also present herewith the biennial report of the Dean of the Faculty of Letters and of the Faculties of Science; reports from the heads of the various departments at Berkeley; from the Director of the Lick Observatory; and from the Deans of the affiliated professional colleges; also a financial statement; thus giving an insight into the detailed workings of every part of the University.

I also transmit herewith the reports of the Secretary of the Board of Regents for the two fiscal years ending, respectively, June 30, 1889, and June 30, 1890, to which I beg to refer you for further information respecting our material affairs, such as the state of the finances and the condition of the buildings and grounds. The Secretary's reports contain other matters where the action of the Board of Regents affects directly the internal working of the University, such as changes in the staff of instruction, degrees granted during the past two years, records of donations to the library and museum, which are omitted here to avoid repetition.

DETAILS CONCERNING INSTRUCTION.

The report of Professor Irving Stringham, Dean of the Faculties at Berkeley, which is inclosed herewith, takes a more general view of affairs at Berkeley than the reports of the professors in charge of departments, and gives the statistics of attendance, and of the courses of study there, and some of the general features of student life. For the more minute particulars, I respectfully refer you to the published Registers of the University for the years 1888–89 and 1889–90, which are transmitted herewith.

ATTENDANCE.

The report of the Dean of the Faculties at Berkeley, which forms a part of this document, shows a steady increase in the number of students in attendance at Berkeley. The numbers have been as follows: 1883–84, 216; 1884–85, 241; 1885–86, 250; 1886–87, 288; 1887–88, 306; 1888–89, 362; 1889–90, 401; and for 1890–91, the number will exceed 450. I am glad to note a steady increase, also, in the Professional Schools, so that the total summary of students in the entire University has advanced as follows: 1886–87, 528; 1887–88, 544; 1888–89, 611; 1889–90, 701. The total for 1890–91 will be about 750. It was observed in the President's report of 1888 that the principal increase at Berkeley had been in the course in Letters and Political Science, and in the Scientific Colleges; the same holds true of the increase of the last two years.

CONDUCT AND SCHOLARSHIP.

The internal condition of the colleges at Berkeley is excellent. The attendance of students upon the college exercises has decidedly improved, and greater interest is manifested in the courses of study. The University is steadily gaining in scholarship, which is due partly to improvement in the preparatory schools, but still more to improvement in the methods of instruction at Berkeley.

AGE OF STUDENTS.

The average age of students entering college remains about the same as in 1888. The annexed table gives the average age, at date of admission, of students entering regular courses (Freshman class) or courses at large (with Freshman standing):

YEAR.	No. of Students Concerned	Average Age.	
		Years.	Months.
1882		18	1.7
1883		18	6.6
1884		18	7.2
1885–86	60	18	6.9
1886–87	77	18	7.9
1887–88	99	19	6.5
1888–89	103	18	8.2
1889–90	127	18	9.8

PHYSICAL CULTURE.

In the matter of physical culture, under the system inaugurated two years ago, every male student is obliged to attend the gymnasium under the direction of Mr. Magee, during his first two years at college; and I am glad to report that the physique of the young men shows a manifest gain under this training. At the same time classes have been established among the young women, but it has not been made compulsory for them. The report of Dr. Payne, Director of Physical Culture, which is transmitted herewith, will give the details of the gymnasium training of the students.

ADMISSION OF STUDENTS.

ENTRANCE CONDITIONS.

As a matter of special interest to teachers, I add the usual table showing the percentage of applicants conditioned (or failing) in the examination in each subject of the requirements for admission:

NOTE.—In the fractions, the numerator shows the number of applicants conditioned, the denominator the total number of applicants taking the examination in the given subject.

No. of Subject.	SUBJECT.	1888.	1889.
1	English	$\frac{21}{109}$=19.26 per cent	$\frac{32}{104}$=30.76 per cent.
2	Arithmetic	$\frac{20}{98}$=20.40 per cent	$\frac{31}{102}$=30.39 per cent.
3	Algebra	$\frac{39}{97}$=40.20 per cent	(a) $\frac{39}{99}$=39.39 per cent. (b) $\frac{46}{77}$=59.74 per cent.
4	Geometry	$\frac{50}{91}$=54.94 per cent	(a) $\frac{36}{96}$=37.47 per cent. (b) $\frac{26}{75}$=34.66 per cent.
5	United States History	$\frac{11}{94}$=11.70 per cent	$\frac{12}{96}$=12.49 per cent.
	Geography	$\frac{2}{93}$= 2.15 per cent	$\frac{2}{99}$= 2.02 per cent.
6	Cæsar	$\frac{10}{42}$=23.80 per cent	$\frac{9}{42}$=21.42 per cent.
	Cicero	$\frac{11}{39}$=28.20 per cent	$\frac{19}{42}$=45.23 per cent.
	Latin composition	$\frac{30}{40}$=75.00 per cent	$\frac{23}{40}$=57.50 per cent.
7	Cicero	$\frac{4}{20}$=20.00 per cent	$\frac{2}{14}$=14.28 per cent.
	Vergil	$\frac{3}{19}$=15.78 per cent	$\frac{4}{12}$=33.33 per cent.
	Latin composition	$\frac{13}{20}$=65.00 per cent	$\frac{6}{13}$=46.15 per cent.
	Latin at sight	$\frac{7}{20}$=35.00 per cent	$\frac{4}{13}$=30.77 per cent.
8	Anabasis	$\frac{2}{5}$=40.00 per cent	$\frac{1}{6}$=16.66 per cent.
	Greek composition		
9	Anabasis	$\frac{3}{4}$=75.00 per cent	$\frac{1}{6}$=16.66 per cent.
	Homer		$\frac{2}{5}$=40.00 per cent.
	Greek composition		$\frac{2}{5}$=40.00 per cent.
	Greek at sight		$\frac{1}{6}$=16.66 per cent.
10	Greek history	$\frac{5}{20}$=25.00 per cent	$\frac{3}{13}$=23.09 per cent.
	Roman history	$\frac{1}{22}$= 4.54 per cent	$\frac{2}{11}$=18.18 per cent.
11	Physics	$\frac{21}{63}$=33.33 per cent	$\frac{40}{74}$=54.05 per cent.
12	Chemistry	$\frac{2}{23}$= 8.69 per cent	$\frac{2}{26}$=76.92 per cent.
	Advanced chemistry	$\frac{8}{10}$=80.00 per cent	$\frac{4}{6}$=66.66 per cent.
	Botany	$\frac{3}{9}$=33.33 per cent	$\frac{0}{3}$=00.00 per cent.
	Physiology	$\frac{3}{33}$= 9.09 per cent	$\frac{2}{37}$=54.05 per cent.
	Mineralogy	$\frac{0}{0}$=	$\frac{0}{0}$=
	Plane trigonometry	$\frac{1}{4}$=25.00 per cent	$\frac{4}{6}$=66.66 per cent.
	Free-hand drawing	$\frac{0}{4}$=00.00 per cent	$\frac{1}{4}$=25.00 per cent.
13	English history	$\frac{2}{18}$=11.11 per cent	$\frac{2}{10}$=20.00 per cent.
14	English	$\frac{24}{59}$=40.67 per cent	$\frac{23}{64}$=35.93 per cent.

The next table shows the results for two years of all the applications for admission to the University:

TABLE SHOWING THE NUMBER, CLASSIFICATION, AND RESULT OF THE APPLICATIONS FOR ADMISSION IN 1888–89 AND IN 1889–90.

NOTE.—The upper figures on the left side of each column refer to young men, the lower to young women; the numbers on the right side are the totals.

	1888–89.								1889–90.							
	Graduate Students	Regular Freshmen	Students at Large	Special Students	Limited Students	TOTALS.			Graduate Students	Regular Freshmen	Students at Large	Special Students	Limited Students	TOTALS.		
TOTAL NUMBER OF APPLICANTS	2 0 2	103 23 126	8 3 11	19 14 33	11 6 17			140 49 189	5 13 18	106 25 131	18 4 22	19 16 35	17 7 24			165 65 230
I. NUMBER RECOMMENDED FOR ADMISSION TO UNIVERSITY	1 0 1	79 20 99	5 3 8	16 10 26	5 4 9			106 37 143	5 13 18	78 21 99	18 4 22	16 12 28	10 5 15			127 55 *182
1. *On recommendation from accredited schools*		24 18 42			0 2 2		24 20 44			29 13 42	14 3 17		4 4 8		47 20 67	
a. Alameda High School		0 5 5			0 1 1	0 6 6				0 1 1	1 0 1		1 1 2	2 2 4		
b. Berkeley High School		4 4 8				4 4 8				2 3 5			0 1 1	2 4 6		
c. Los Angeles High School										3 0 3	1 0 1			4 0 4		
d. Oakland High School		6 7 13			0 1 1	6 8 14				9 5 14	8 3 11		1 1 2	18 9 27		
e. Sacramento High School		1 1 2				1 1 2				2 3 5				2 3 5		
f. San Bernardino Academy										2 0 2			0 1 1	2 1 3		
g. San Francisco Boys' High School		12 1 13				12 1 13				10 1 11	4 0 4		2 0 2	16 1 17		
h. Stockton High School		1 0 1				1 0 1				1 0 1				1 0 1		

2. *On formal examination*	------ ------	54 2 56	2 1 3	13 8 21	3 1 4	------ ------	72 12 84	------ ------	------ ------	48 8 56	3 0 3	0 2 2	4 0 4	------ ------	55 10 65	------ ------
a. Without conditions	------ ------	5 0 5	1 0 1	12 8 20	1 1 2	19 9 28	------ ------	------ ------	------ ------	8 1 9	------ ------	0 1 1	2 0 2	10 2 12	------ ------	------ ------
b. With conditions	------ ------	49 2 51	1 1 2	1 0 1	2 0 2	53 3 56	------ ------	------ ------	------ ------	40 7 47	3 0 3	0 1 1	2 0 2	45 8 53	------ ------	------ ------
3. *On informal examination and on credentials from universities*	1 0 1	1 0 1	3 2 5	3 2 5	2 1 3	------ ------	10 5 15	------ ------	5 13 18	1 0 1	1 1 2	16 10 26	2 1 3	------ ------	25 25 50	------ ------
II. NUMBER REJECTED OR WITHDRAWN	1 0 1	24 3 27	3 0 3	3 4 7	3 5 8	------ ------	------ ------	34 12 46	------ ------	28 4 32	------ ------	3 4 7	7 2 9	------ ------	------ ------	38 10 48

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* Of this number, only 163 actually entered the University.

CHANGES IN THE REQUIREMENTS FOR ADMISSION.

1. English, Subject 1. In 1888, the following announcement was made: In 1891, and thereafter until further notice, Plutarch's Lives (Ginn's selection) will take the place of Tom Brown's School Days. In 1889 and 1890 either Plutarch or Tom Brown will be accepted.

In 1890, it was announced that Plutarch's Lives would be continued until further notice as an alternative with Tom Brown's School Days.

2. Algebra and Geometry, Subjects 3 and 4. In 1889, it was announced that the requirements in Algebra and Geometry for the Classical Course, the Literary Course, and the Course in Letters and Political Science (Groups I. and II.) would be increased by the addition of Subjects 3*b* and 4*b*, thus making the requirements in Mathematics the same for all courses.

3. Subject 5. In 1889, it was announced that in 1892, and afterwards, Subject 5 would be Government of the United States, instead of History and Geography.

4. Ancient History and Geography, Subject 10. In 1889, the text-books referred to as indicating the amount required were made Smith's History of Greece and Liddell's History of Rome, instead of Smith's Smaller History of Greece and Smith's Smaller (or Leighton's) History of Rome.

5. Subject 13. In 1889, the following announcement was made: In 1892, and afterwards, Subject 13 will be General European History, instead of the present requirement in History of England. Fisher's Outlines of Universal History, pages 198 to 637, will indicate the period to be covered and the amount required.

6. English, Subject 14. In 1888, the following announcement was made: In 1891, and thereafter until further notice, Milton's Comus (Clarendon Press, or Clark and Maynard) will take the place of the following selections in Hales' Longer English Poems: Dryden's Mac Flecknoe, Johnson's London and the Vanity of Human Wishes, and Scott's Cadyow Castle. In 1889 and 1890, either Comus or the selections mentioned in Hales' will be accepted.

PLACES OF ENTRANCE EXAMINATIONS.

In June, 1889, and June, 1890, besides holding entrance examinations at Berkeley, we have sent members of the Faculties to Los Angeles, Grass Valley, Chico, and Visalia, to hold similar examinations. The results are given in the following table:

PLACES.	NUMBER OF APPLICANTS.			
	Matriculation.	Preliminary.	Law.	Totals.
In June, 1886:				
Berkeley	38	2	------	40
Los Angeles	7	5	------	12
Marysville	1	2	------	3
Totals	46	9	------	55
In June, 1887:				
Berkeley	37	1	1	39
Los Angeles	10	7	------	17
Chico	1	2	------	3
Grass Valley	6	5	------	11
Totals	54	15	1	70
In June, 1888:				
Berkeley	60	1	4	65
Los Angeles	13	3	1	17
Chico	------	2	------	2
Grass Valley	2	------	------	2
Totals	75	6	5	86
In June, 1889:				
Berkeley	72	3	2	77
Los Angeles	7	6	0	13
Grass Valley	1	0	0	1
Chico	0	0	0	0
Visalia	0	0	0	0
*Placerville	0	2	0	2
Totals	80	11	2	93
In June, 1890:				
Berkeley	72	3	8	83
Los Angeles	15	4	1	20
Grass Valley	5	1	0	6
Chico	1	0	0	1
Visalia	1	0	1	2
Totals	94	8	10	112

* Special examination.

It seems to me that in the case of Grass Valley, Chico, and Visalia, instead of sending an officer of the University to hold an examination, it would be better to advertise that such an examination would be held if a sufficient number of candidates for admission made application by letter to the Recorder of the Faculties at Berkeley.

ADMISSION FROM ACCREDITED SCHOOLS.

At the time of my last report, in 1888, six schools were authorized to recommend their graduates for admission to the University without examination; since then there has been a very gratifying increase of accredited schools, and during the past two years we have admitted without examination applicants recommended by the Principals of the following schools:

1. Schools that have covered all our requirements for admission:

Belmont School (private).
Berkeley High School.
Los Angeles High School.
Oakland High School.
Sacramento High School.
San Francisco Boys' High School.

2. Schools that have been authorized to recommend their graduates for a part of our requirements:

Alameda High School.
Berkeley Gymnasium (private).
Petaluma High School.
San Bernardino Academy (private).
San Diego High School.
San Francisco Girls' High School.
San José High School.
Santa Cruz High School.
Stockton High School.

A very gratifying desire is shown in all the large towns of the State to improve their schools and form a vital connection with the University, and we confidently expect a very considerable increase in the number of accredited schools before another biennial report is issued.

RELATION TO THE PUBLIC SCHOOLS.

One phase of our experience which has interested me almost as much as the improvement of instruction at Berkeley, has been our relation to the public schools. Feeling our responsibility as the highest educational institution supported by public taxation in the State, we have sought to bring ourselves into organic connection with the school system of the State. To this end we sought a conference with the High School teachers, and in February and March, 1889, we succeeded in meeting at the Mechanics' Institute, of San Francisco, representatives of most of the High Schools in the central part of the State. The object was to arrange a curriculum for the schools which should be satisfactory both to them and to the University. A series of conferences was held, and finally the subjoined report was adopted:

High School Curriculum Adopted by the Conference, March 16, 1889.

	Recitations.	
	First Term.	Second Term.
JUNIOR.		
SCIENTIFIC—		
Algebra, to Quadratics	5	5
English	5	5
Science	4	4
Latin	5	5
LITERARY—		
Latin	5	5
English	5	5
Algebra, to Quadratics	5	5
Grecian History	—	4
CLASSICAL—		
Latin	5	5
English	5	—
Algebra, to Quadratics	5	5
Greek	—	5
Grecian History	—	4
MIDDLE.		
SCIENTIFIC—		
Geometry—Plane	5	5
English	5	5
Science	4	4
History*	4	4
Latin	5	5
LITERARY—		
Latin	5	5
English	5	5
Geometry—Plane	5	5
Roman History	4	—
General European History	—	4
CLASSICAL—		
Latin	5	5
Greek	5	5
English	—	5
Geometry—Plane	5	5
Roman History	4	—
SENIOR.		
SCIENTIFIC—		
Algebra—Quadratics	5	—
English	5	5
Science	4	4
Government of the United States†	—	4
Solid Geometry	—	5
LITERARY—		
Latin	5	5
English	5	5
Government of the United States†	—	4
Algebra—Quadratics	5	—
Science	4	4
CLASSICAL—		
Latin	5	5
Greek	5	5
English	5	—
Government of the United States†	—	4
Algebra—Quadratics	5	—

* Recommended as a requirement for admission to the University.

† Requirement for admission to the University in 1892 and thereafter.

N. B.—The subjects in Roman letters are requirements for admission to the University. The subjects in italics are suggested alternative studies. Twenty recitations, each forty-five minutes in length, are regarded as the standard weekly work.

Again, in June, 1890, the Faculty of the University invited the Principals of the State Normal Schools of San José, Los Angeles, and Chico to visit Berkeley, at the time of the annual meeting in Sacramento of the State Board of Education. They responded to our invitation, and an interesting conference followed upon our mutual relations and interests. It would greatly benefit the schools of the State if a larger percentage of our teachers were to take a college course, or even to spend one or two years at Berkeley.

CHANGES IN THE TEACHING STAFF.

The full particulars of the changes in the teaching staff of the University that have taken place during the last two years will be found in the Annual Report of the Secretary of the Board of Regents for the year ending June 30, 1889, and for the year ending June 30, 1890. To afford means of comparison with previous years I append a

Table Showing the Number of Professors, Associate Professors, Assistant Professors, Lecturers, Instructors, and Assistants in the Colleges at Berkeley during each Academic Year—Compiled from the Annual Registers.

Year.	Professors.	Associate Professors.	Assistant Professors.	Lecturers.	Instructors.	Assistants.	Totals.
1869–70	8		1		1		10
1870–71	10		1		1	1	13
1871–72	10		2		1		13
1872–73	12		1		4		17
1873–74	11		1		7	3	22
1874–75	14		1		9	6	30
1875–76	15				16	7	38
1876–77	15				15	6	36
1877–78	16				18	4	38
1878–79	15				19	3	37
1879–80	14				18	3	35
1880–81	14				16	6	36
1881–82	12				16		28
1882–83	13				15		28
1883–84	15				15		30
1884–85	16		1		13	5	35
1885–86	18		2		12	6	38
1886–87	20		5		10	7	42
1887–88	18		6		9	10	43
1888–89	19		6	1	8	11	45
1889–90	19	6	2	1	10	14	52

NEW BUILDINGS.

In my last report I spoke of the pressing necessity of separate accommodations for the Chemical Department. In accordance with this suggestion the Board of Regents determined upon the erection of a new Chemical Laboratory, which is now nearly completed, and when finished will be one of the most thoroughly equipped and convenient laboratories in the country. When the Chemical Department moves to its new home, that portion of the Department of Physics which is now located in North Hall will be moved to South Hall.

A year ago the Regents made extensive alterations in the upper story of Mechanics' Hall, and the Draughting Department of the College of Mechanics was moved to that locality. The space thus vacated in North Hall was divided into rooms for the English Department, which had been much crowded, but by this change had ample and convenient accommodations. The rapid growth of the University during the last six years has made necessary constant rearrangement of the classes and class-rooms.

THE UNIVERSITY LIBRARY.

No department of the University is of such universal and such constant usefulness as the Library. It is small as compared with the large universities, containing only forty thousand volumes, but it has been selected with care, and is of great value. Its shelves lie open to the students, who have free access to every part of it, and the result is a much increased use of its facilities; its alcoves and tables are crowded with students at all hours. In the absence of dormitories, the various portions of the Library Building are occupied by students as study-rooms between their recitations; indeed, they are the only places on the college grounds available for the young men.

The recent publication of the Contents-Index of the Library has added greatly to its usefulness, although the student has always found willing and generous help from the Librarians.

The donations to the Library and Museums during the last two years will be found recorded in the Annual Report of the Secretary for the year ending June 30, 1889, and for the year ending June 30, 1890.

UNIVERSITY PUBLICATIONS.

Among the publications of the University within the past two years may be mentioned the following, copies of which are transmitted herewith:

The University Register for 1888–89, and for 1889–90.

The Circular of the College of Letters and the Colleges of Science for 1889.

The Annual Announcement of Courses of Instruction in the Colleges at Berkeley for 1889–90, and for 1890–91.

The Biennial Report of the President for 1888, and for 1890.

The Annual Report of the Secretary for 1889, and for 1890.

The Annual Report of the Professor of Agriculture for 1889, and for 1890.

The Agricultural Bulletins.

Library Bulletin, No. 11: A Guide to the Literature of Æsthetics, by Prof. C. M. Gayley of the University, and Prof. F. N. Scott of the University of Michigan.

Contents-Index of the Library, Volume I., by Librarian J. C. Rowell.

The Annual Announcement of the College of Medicine for 1889, and for 1890.

The Annual Announcement of the College of Dentistry for 1889, and for 1890.

The Annual Announcement of the College of Pharmacy for 1889, and for 1890.

THE LICK OBSERVATORY.

Since the last Biennial Report, the Lick Observatory has fairly begun its great work. I need not speak of its achievements during the past two years or of its present condition, as a detailed statement of them will be found in the report of the Director, which is transmitted herewith.

AFFILIATED PROFESSIONAL COLLEGES.

The affiliated professional colleges are prosperous and continue to increase in numbers, although the entrance requirements have been increased materially during the last four years. For further details of their condition I beg to refer to the reports of the Deans of the different colleges, which form part of this document, and to the Registers of the University forwarded herewith.

WANTS OF THE UNIVERSITY.

The wants of the different departments have been set forth by the professors in charge in their reports. I will only mention here such as seem to me to be especially pressing. In the matter of buildings, we need very much a new

MUSEUM BUILDING,

Which should be fire-proof and large enough to receive the accumulations of the University for many years to come. At present the exceedingly valuable collections are stored in a building at constant risk of fire, and even there they are so crowded together that they cannot be properly displayed, either for purposes of curiosity or of instruction. I spoke of this need in my last report, and at the same time of the want of a

WOMEN'S BUILDING.

The young women now number nearly one hundred, and should be provided with a building of their own, with appropriate study and reception rooms. Their present accommodations are utterly inadequate, and yet they are all that can be spared from our present buildings. A fine opportunity is here given for some generous friend of education in California to embalm his memory, either by erecting a women's hall or a museum building.

There are also certain lines of instruction which are imperatively called for at Berkeley, in addition to the present courses. The most important of these are electrical engineering, biology, and pedagogy.

ELECTRICAL ENGINEERING.

Every year more or less young men go by our doors and enter the eastern colleges and technical schools, to study the application of electricity to the distribution of power. The inquiry has been repeatedly made of me why the University did not offer such courses, and I feel confident there is a real demand for such instruction, which should be met very soon.

BIOLOGY.

Almost every college of high grade in the country offers more or less instruction in biology. We are behind the times in this respect, and the gap ought to be speedily closed. A beginning might be made at once by the appointment of a laboratory assistant to the Department of Zoölogy. But the importance of the subject is so fundamental, even from the educational point of view, and as a preparation for the profession of medicine, that, as soon as possible, a new department ought to be created, with a full professor in charge.

PEDAGOGICS.

And I would make a special plea for instruction in the art of teaching. Such chairs have been established in many of the older colleges, and have proved of great value. Here we teach farming, mining, engineering, and other practical pursuits, but entirely neglect teaching, which, in these modern times, is an especial function of the Government, and for which it should provide in all its grades. I have said elsewhere in this report that a larger proportion of college graduates among high school teachers would be a great benefit, but the objection is always made to our graduates fresh from college that they have no practical knowledge of the art of teaching. Their general information and intelligence may be all that can be wished, but in the special art, the profession of teaching, they are quite ignorant. This should not be; the State University should be equipped in all respects to furnish the schools of the State with first class teachers. If the graduates of the Normal School were ambitious for a broader culture in the line of their profession, we ought to be able to offer it to them. At present, the ambitious Normal School graduate who wants to perfect himself in his specialty, passes by our doors to some eastern college which maintains a chair of Pedagogy. We were assured by the Principals of the Normal Schools, at our conference with them in June, that this need not be, and would not be, if such a chair were established at Berkeley. In conclusion, I will add that the need of instruction in the science and art of teaching was noted by President Reid in his Biennial Report of 1884.

AID TO STUDENTS.

What was stated in the President's Report of 1888, regarding the need of some fund to aid meritorious students of small means, may be repeated here. Many cases occur every year of young men and women of great merit being forced out of college by the lack of means. A few scholarships of moderate amount, say $200 to $300 each, or a loan fund whose income could be distributed in small sums, would be a very great blessing. I appeal earnestly to our wealthy citizens to bear this need in mind.

The Frank J. Walton Scholarship.

The class of 1883 have contributed a fund of nearly $2,000, whose income will soon be available for these purposes, the amount having been paid over to the Board of Regents during the past year.

The Harvard Club Prize.

This is a prize of $250 which has been awarded annually for the past three years by the Harvard Club of San Francisco to some graduate of this University, the prize to be used by the recipient in the pursuit of post graduate study at Harvard University. In accordance with the recommendation of the Academic Council, it was awarded in 1887 to Adolph Casper Miller, who graduated that year; and on recommendation of the Faculty of Harvard College it was again awarded to Mr. Miller in 1888. In 1889 Mr. Miller was chosen to a position in the teaching staff of Harvard, and Mr. William Emerson Ritter, B.S., 1888, was recommended by our Academic Council and received the prize. I am pleased to add that on the departure of Professor Bernard Moses for Europe in the summer of 1890, on a year's leave of absence, Mr. A. C. Miller was called to this University, his Alma Mater, to take charge of a portion of the instruction in History and Political Economy.

CONCLUSION.

Under the terms of the statute the President's Biennial Report must be issued by October first, and should cover the two years ending June thirtieth, but it has usually been issued at a somewhat later date, and has included the beginning of the fall term in order to give the condition of the University at as late a period as possible. For this reason, in order to conform to the custom, although my term of office closes on September fifteenth, I have made provision for some statistics dealing with the commencement of the fall term.

I ought also to state that I am indebted for the carefully constructed statistical tables included in my own report, to the faithful diligence of Mr. Finlay Cook, Recorder of the Faculties at Berkeley, and Mr. James Sutton, clerk to the Recorder.

All of which is respectfully submitted.

HORACE DAVIS,
President of the University.

BERKELEY, September 1, 1890.

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COLLEGES AT BERKELEY.

REPORT OF THE DEAN OF THE COLLEGES OF LETTERS, AGRICULTURE, MECHANICS, MINING, CIVIL ENGINEERING, AND CHEMISTRY.

To the President of the University of California:

Sir: I have the honor to submit herewith the following general report on attendance and courses of instruction in the Colleges of Letters, Agriculture, Mechanics, Mining, Civil Engineering, and Chemistry, for the academic years 1888–89 and 1889–90.

ATTENDANCE.

The following tables exhibit in detail the number of persons enrolled during the past four years: (1) in the several classes into which the students are grouped, (2) in the eight undergraduate courses. The upper figures on the left refer to young men, the lower to young women; the numbers in the lower right-hand corner of each group are the totals:

Enrollment by Classes.

	Enrolled During the Year.				Withdrew During the Year.			
	1886–87.	1887–88.	1888–89.	1889–90.	1886–87.	1887–88.	1888–89.	1889–90.
Graduates	8 1 9	8 4 12	15 0 15	15 6 21	2 0 2	3 1 4	1 0 1	3 2 5
Seniors	29 5 34	29 3 32	34 4 38	32 7 39	0 0 0	2 0 2	3 0 3	1 0 1
Juniors	37 4 41	34 3 37	36 8 44	45 6 51	4 0 4	2 0 2	4 2 6	2 3 5
Sophomores	45 5 50	40 10 50	53 13 66	34 12 46	6 2 8	3 0 3	5 1 6	3 2 5
Freshmen	68 8 76	75 18 93	80 13 93	76 18 94	9 0 9	11 3 14	20 1 21	10 6 16
At large	14 1 15	26 2 28	31 5 36	54 11 65	6 0 6	5 0 5	7 1 8	8 1 9
Special	16 5 21	21 5 26	27 12 39	26 17 43	9 1 10	12 2 14	7 3 10	4 4 8
Limited	26 16 42	19 9 28	15 17 32	26 16 42	3 5 8	6 1 7	4 6 10	3 7 10
Totals	243 45 288	252 54 306	291 72 363	308 93 401	39 8 47	44 7 51	51 14 65	34 25 59

Enrollment by Colleges.

	Enrolled During the Year.				Withdrew During the Year.			
	1886–87.	1887–88.	1888–89.	1889–90.	1886–87.	1887–88.	1888–89.	1889–90.
Classical	48 4 52	47 4 51	39 10 49	41 10 51	5 0 5	2 1 3	1 1 2	1 3 4
Literary	27 23 50	20 20 40	26 24 50	24 29 53	4 7 11	1 4 5	7 6 13	3 5 8
Letters and Political Science	66 15 81	79 27 106	91 32 123	104 41 145	7 1 8	14 2 16	15 7 22	14 16 30
Agriculture	6 0 6	6 0 6	10 0 10	9 0 9	4 0 4	2 0 2	2 0 2	3 0 3
Mechanics	18 0 18	22 0 22	26 0 26	27 1 28	4 0 4	4 0 4	5 0 5	3 0 3
Mining	17 0 17	24 0 24	24 0 24	25 0 25	5 0 5	7 0 7	4 0 4	2 0 2
Civil Engineering	37 1 38	33 1 34	50 1 51	42 0 42	5 0 5	5 0 5	13 0 13	3 0 3
Chemistry	24 2 26	21 2 23	25 5 30	21 6 27	5 0 5	9 0 9	4 0 4	5 1 6
Totals	243 45 288	252 54 306	291 72 363	308 93 401	39 8 47	44 7 51	51 14 65	34 25 59

The above enumeration includes:

	1888–89.	1889–90.
Students who returned from former classes	13 1 14	5 1 6

The following table gives the number of those who, having been enrolled during the academic year 1887–88, did not return for the continuation of their course in 1888–89; similarly, of those who, enrolled during 1888–89, did not return in 1889-90:

	1888–89.		1889–90.	
Graduates	3		7	
	4	7	0	7
Seniors	1		0	
	0	1	0	0
Juniors	3		4	
	0	3	2	6
Sophomores	5		6	
	1	6	4	10
Freshmen	15		23	
	4	19	3	26
At large	7		6	
	0	7	0	6
Special	14		11	
	2	16	4	15
Limited	6		4	
	3	9	8	12
Totals	54		61	
	14	68	21	82

To these figures may be added the number of those who graduated, namely:

	1888.		1889.	
Seniors	27		29	
	3	30	4	33
At large	3		3	
	0	3	1	4
Special	1		1	
	0	1	0	1
Limited	1		0	
	0	1	1	1
Totals	32		33	
	3	35	6	39

Under the heading, "Withdrew during the year," are included the following:

	1886–87.	1887–88.	1888–89.	1889–90.
Received honorable dismissal	4	3	10	12
Withdrew informally	2	28	16	6
Obtained leave of absence	37	20	37	33
Dropped from the roll	4	0	2	8
Totals	47	51	65	59

Of those who were admitted in June and September, five obtained an extension of their certificates of admission in 1888, eleven in 1889.

In looking to the welfare of students, it is of some importance to know what circumstances have made it necessary for them to interrupt their studies. The following table furnishes such statistics concerning this matter as are available:

REASONS ASSIGNED FOR REQUESTING	LEAVE OF ABSENCE.				HONORABLE DISMISSAL.			
	1888–89.		1889–90.		1888–89.		1889–90.	
Illness	8 3	11	3 5	8	-----		-----	
Weakness of eyes	5 1	6	2 0	2	-----		-----	
Illness in family	1 0	1	2 1	3	-----		1 0	1
Business	3 0	3	2 0	2	2 0	2	-----	
Travel	2 0	2	2 1	3	-----		1 0	1
Financial difficulty	2 0	2	2 0	2	-----		-----	
Request of parent or guardian	1 1	2	-----		-----		1 0	1
Study elsewhere	3 0	3	-----		1 1	2	-----	
Further preparation	1 0	1	1 1	2	-----		-----	
No reason given	3 3	6	6 5	11	6 0	6	5 4	9
Totals	29 8	37	20 13	33	9 1	10	4 8	12

One death—an unusually sad one—has occurred among our students in the past two years. Charles Claussen died of typhoid fever but a few days before his expected graduation in June, 1889.

The following table gives the statistics of the entire enrollment in the several Colleges at Berkeley since the organization of instruction in the University in 1869. Until the close of 1872–73, students were classed as *Students in Letters* (that is, students in the *Classical Course* as at present designated) and *Students in Science.* The students in science were not sub-classified until 1873–74, when the present classification into the five Colleges of Science was adopted. But until 1884–85 this sub-classification did not take place until the beginning of the Sophomore year, so that up to that time science students in their first year appear as *Unclassified.* The *Literary Course* was organized in 1874–75. The *Course in Letters and Science,* afterwards called the *Course in Letters and Political Science,* was authorized by the Regents in 1881:

ENROLLMENT IN THE VARIOUS COLLEGES FROM 1869 TO 1890.

NOTE.—In the columns showing the number of students, the upper figures on the left refer to young men, the lower to young women; the numbers on right side of column are the totals.

ACADEMIC YEAR.	Graduate Students	UNDERGRADUATE STUDENTS.										Totals.
		COLLEGE OF LETTERS.			COLLEGES OF SCIENCE.						Unclassified	
		Classical Course	Literary Course	Co'se in Letters and Political Science	Agriculture	Mechanics	Mining	Civil Engineering	Chemistry	Unclassified		
1869–70	0 0 0	21	-----	-----	-----	-----	-----	-----	-----	14	5	40
1870–71	3 0 3	28 0 28	-----	-----	-----	-----	-----	-----	-----	33 0 33	21 8 29	85 8 93
1871–72	0 0 0	28 0 28	-----	-----	-----	-----	-----	-----	-----	74 1 75	23 27 50	125 28 153
1872–73	0 0 0	42 2 44	-----	-----	-----	-----	-----	-----	-----	84 9 93	20 28 48	146 39 185
1873–74	2 0 2	44 1 45	-----	-----	7 1 8	2 0 2	0 0 0	17 0 17	7 0 7	68 4 72	22 16 38	169 22 191
1874–75	8 1 9	49 6 55	27 29 56	-----	5 0 5	0 0 0	3 0 3	19 2 21	13 0 13	71 2 73	2 1 3	197 40 237
1875–76	5 0 5	50 8 58	66 31 97	-----	3 0 3	3 0 3	7 0 7	15 2 17	11 0 11	108 1 109	0 0 0	268 42 310
1876–77	3 0 3	47 6 53	73 38 111	-----	4 0 4	5 0 5	23 0 23	32 0 32	18 0 18	56 0 56	2 0 2	263 44 307
1877–78	4 0 4	57 8 65	79 38 117	-----	3 0 3	7 0 7	19 0 19	28 0 28	13 1 14	59 4 63	0 0 0	269 51 320

1878–79	5	5	48	56	88	128	......	......	2	2	10	10	18	18	27	27	7	9	72	77	0	0	277	332
	0		8		40				0		0		0		0		2		5		0		55	
1879–80	5	7	38	46	88	113	......	......	9	9	10	10	13	13	11	11	16	18	37	41	0	0	227	268
	2		8		25				0		0		0		0		2		4		0		41	
1880–81	0	0	29	34	57	99	......	......	16	17	12	12	11	11	14	14	13	18	30	30	2	11	184	246
	0		5		42				1		0		0		0		5		0		9		62	
1881–82	2	3	35	39	55	100	......	......	14	14	5	6	8	8	16	16	12	13	24	25	0	0	171	224
	1		4		45				0		1		0		0		1		1		0		53	
1882–83	0	0	42	49	32	82	15	21	4	4	0	0	5	5	13	14	9	9	26	27	0	4	146	215
	0		7		50		6		0		0		0		1		0		1		4		69	
1883–84	6	6	41	49	30	63	20	28	3	3	1	1	14	14	7	8	7	9	35	35	0	0	164	216
	0		8		33		8		0		0		0		1		2		0		0		52	
1884–85	5	5	43	49	23	50	37	47	8	8	10	10	20	20	29	30	21	22	0	0	0	0	196	241
	0		6		27		10		0		0		0		1		1		0		0		45	
1885–86	9	11	39	43	21	42	51	65	7	7	12	12	23	23	27	28	18	19	0	0	0	0	207	250
	2		4		21		14		0		0		0		1		1		0		0		43	
1886–87	8	9	45	50	27	49	66	81	5	5	17	17	16	16	34	36	23	25	0	0	0	0	243	288
	1		5		22		15		0		0		0		2		2		0		0		45	
1887–88	8	12	45	49	19	37	79	104	6	6	21	21	22	22	32	33	20	22	0	0	0	0	252	306
	4		4		18		25		0		0		0		1		2		0		0		54	
1888–89	15	15	38	48	24	48	90	122	9	9	23	23	23	23	49	50	20	25	0	0	0	0	291	363
	0		10		24		32		0		0		0		1		5		0		0		72	
1889–90	15	21	41	51	24	53	105	145	9	9	27	28	25	25	42	42	21	27	0	0	0	0	309	401
	6		10		29		40		0		1		0		0		6		0		0		92	

STATUS OF STUDENTS; IRREGULAR STUDENTS.

The Organic Act creating the University declares that:

> * * * Each college shall also have a partial course for those who may not desire to pursue a full course therein; and any resident of California of the age of fourteen years or upwards, of approved moral character, shall have the right to enter himself in the University as a student at large, and receive tuition in any branch or branches of instruction at the time when the same are given in their regular course, on such terms as the Board of Regents may prescribe. * * *

This law has always been complied with in some form. From the time of the organization of instruction in the University in 1869, until 1880, three classes of students were recognized: students in regular four-year courses, students at large, who were always required to pass the entrance examinations, and special students; the last two classes corresponding to the students at large and students in partial courses of the Organic Act.

Gradually the special student class, usually admitted without formal examination, became incumbered with a miscellaneous group of students, some good and some bad, who were ranging at random over the curriculum, and could not properly be classed as doing special work. This fact led to a new classification, which was adopted by the Faculties in August, 1880. It was a division of students into four groups, as follows:

I. *Regular Students*, who have passed the regular matriculation examinations, and who are in regular courses and classes, and subject to all rules relating to attendance, conditions, promotions, etc. They receive a degree upon the completion of a prescribed course of study.

II. *Students at Large*, who have also passed the regular matriculation examinations and who have full work, but are allowed to make an election of studies, subject to approval by the Faculty. By vote of the Faculty, they may receive a degree when any prescribed curriculum has been completed.

III. *Special Students*, who are of mature age, and devote their time to a special line of work. They are examined by the head of the department which they wish to enter, recommended for entrance by him, and their application is approved by the President. They are not subject to the same supervision as regular students. If they abuse their privileges or neglect them, they may be required to withdraw.

IV. *Partial Course Students*, who may wish to take a partial course, and can profit by the advantages offered in the University. They may be admitted, by special vote of the Faculty, upon the recommendation of the special committee to whom their application must be referred, without passing the regular matriculation examinations, but only such as may be required by the heads of departments and the special committee. Students living away from home will not be admitted to this class except under extraordinary circumstances.

There has been no essential change in this classification up to the present time, but important changes have taken place in our method of dealing with the group of irregular students. It was found to be very difficult to keep undeserving applicants off the partial course list—incapables that crept upon our rolls by that approach, because they could usually do so without standing the test of examinations.

In February, 1885, a restatement of our classification was made official, as a part of the Joint Regulations of the Faculties. It says:

> In respect to status, students are classed as Graduate and Undergraduate; and Undergraduates as Regular Students, Students at Large, and Partial Course Students, the latter being further classified as Special Students and Limited Course Students.

The precise definition of each status, in revised form, but not essentially different in substance from the previous one, became also a part of the Joint Regulations of the Faculties. The exact wording of these definitions is given in the successive issues of the University Register. (See page 24 of the Registers for 1888–89 and for 1889–90.)

In accordance with this regulation, our present grouping of students in respect to status, is:

I. Graduate students.
II. Undergraduate students.
  A. (1) Seniors.
    (2) Juniors.
    (3) Sophomores.
    (4) Freshmen.
  B. Students at large.
  C. (1) Special students.
    (2) Limited students.

Group A includes all regular students, group C all students in partial courses.

The following additional regulations accompanied this latest classification:

An applicant for admission to the limited status must pass the first five entrance examinations: (1) Elementary English, (2) Arithmetic, (3) Algebra to quadratics, (4) Geometry, omitting one book, (5) Geography and United States History. This rule has always been interpreted to mean that the applicant will not be admitted with conditions in any of these subjects.

The privileges of a partial course are limited to the academic year in which they are granted, and can only be renewed by direct vote of the Faculty.

Any student in a partial course, who fails in half his work during any term, shall be dropped from the roll.

Still other safeguards have since been thrown around limited courses, such as the following:

A limited student may be allowed during his first year in college to elect a full schedule of studies, but if he be readmitted to the limited status in any subsequent year, his work is restricted to twelve recitations a week.

A regular student, who fails to do satisfactory work, may be placed in limited status and required to restrict his work to twelve hours a week, until he shall make good his claim to the privileges of a regular student in such manner as is satisfactory to the Faculty.

The classification of 1880 into special students and partial course students drew attention to the peculiar status of the latter, and to the necessity of watching them carefully, but it was not sufficient to prevent many immature and poorly prepared applicants from being admitted to participation in work for which they were subsequently found to be wholly unfitted.

The requirement that every applicant for the limited status shall pass unconditionally in every one of the above named five elementary subjects has disposed of the difficulty. Admitted in this way, the limited student gets no favors that are coveted by the indolent student. He can only secure the right to elect a full complement of studies after his first year in college, by passing the remaining entrance examinations and becoming a regular student or student at large. This is a wholesome restriction; but it is important to observe that opportunity is given through the limited status to young men, who come to us from places where schools giving full preparation for our entrance examinations do not exist, to enter the University in limited standing and to eventually gain regular standing and graduate, when, if in every case they were compelled to remain at home until they could prepare for all our examinations, some able and deserving young men that are now on our rolls would never get to us.

While we adhere as closely as possible to the rule that the privileges of a special course shall be restricted to persons of mature age and character, we still require no formal entrance examinations of special students, and it is inevitable that the special status should now provide the gap through which the incapables seek to get the privileges of a general course without standing the test of entrance examinations. This is the weak point in our present procedure with reference to the class of irregular students, and the prevention of abuses is somewhat difficult. The remedy is to refuse to readmit the offending student, or if he has succeeded in crowding himself as a special student into too many unrelated courses, to force him into a regular course, or course at large, requiring him to make good his matriculation for the purpose. If he *fails* in half his work during any term, he is *ipso facto* dropped from the roll.

It is my opinion that in the main our present procedure in the treatment of irregular students works fairly well.

The following table gives the number of students accredited to each status during each year since the organization of instruction in the University. I call attention to the fact that the number of students classed as special has steadily increased since 1884, while the number in limited status has remained, on the average, stationary.

NOTE.—The upper figures on the left side of each column refer to young men, the lower to young women; the numbers on the right side are the totals.

	Graduate.		Regular.		At Large.		Special.		Total.	
1869–70										40
1870–71	3		61		19		2		85	
	0	3	0	61	8	27	0	2	8	93
1871–72	0		100		15		8		123	
	0	0	1	101	5	20	22	30	28	151
1872–73	0		126		12		8		146	
	0	0	11	137	1	13	27	35	39	185
1873–74	2		138		16		13		169	
	0	2	6	144	2	18	14	27	22	191
1874–75	8		158		18		14		198	
	1	9	13	171	2	20	23	37	39	237
1875–76	5		246		6		12		269	
	0	5	26	272	1	7	14	26	41	310
1876–77	3		240		15		6		264	
	0	3	28	268	0	15	16	22	44	308
1877–78	4		236		20		9		269	
	0	4	31	267	1	21	19	28	51	320
1878–79	5		232		27		13		277	
	0	5	33	265	5	32	17	30	55	332
1879–80	5		167		28		13		213	
	2	7	32	199	5	33	16	29	55	268

	Graduate.		Regular.		At Large.		Special.		Partial.		Total.	
1880–81	0		140		16		13		15		184	
	0	0	27	167	5	21	10	23	20	35	62	246
1881–82	2		135		10		6		19		172	
	1	3	26	161	6	16	0	6	19	38	52	224
1882–83	0		114		10		8		16		148	
	0	0	25	139	7	17	0	8	35	51	67	215
1883–84	6		123		8		7		20		164	
	0	6	26	149	3	11	0	7	23	43	52	216

	Graduate.		Regular.		At Large.		Special.		Limited.		Total.	
1884–85	5		129		16		10		36		196	
	0	5	22	151	1	17	0	10	22	58	45	241
1885–86	9		146		11		9		26		201	
	2	11	19	165	0	11	4	13	17	43	42	243
1886–87	8		179		14		16		26		243	
	1	9	22	201	1	15	5	21	16	42	45	288
1887–88	8		178		26		21		19		252	
	4	12	34	212	2	28	5	26	9	28	54	306
1888–89	15		203		31		27		15		291	
	0	15	38	241	5	36	12	39	17	32	72	363
1889–90	15		187		54		26		26		308	
	6	21	43	230	11	65	17	43	16	42	93	401

By a glance at the third group of figures in this table, it will be observed that during the past six years the number of students in limited status has remained approximately stationary, in spite of the large increase in the total number of students in the University; while the students at large and in special courses have about quadrupled in number, an especially large increase having taken place in the past year. Comparing the figures in the first and last years of this group, the percentage of increase for the six years is:

In students at large	283
In special students	330
In students in all courses	66½

The undoubted causes of this disproportionate increase in these two classes of students are, in the one case a growing desire for greater freedom of election, in the other the privileges applicants for the special status may acquire without formal entrance examinations.

COURSES OF INSTRUCTION.

In the following tables is shown the entire scheme of courses given during the past two years, and the attendance upon each course. The difference between the numbers of those here described as in attendance and those passing final examination includes not only all students who appeared at the regular examinations and were conditioned, but also all students who for any cause were absent from the regular examinations:

RECORD OF COURSES OF INSTRUCTION FOR THE YEAR 1888-89.

NOTE.—In the columns showing number of students, the upper figures on the left refer to young men, the lower to young women; the numbers on right side of column are the totals.

INSTRUCTOR.	Number	TITLE AND DESCRIPTION OF COURSE.	No. of Hours a Week.		No. of Students in Attendance	No. of Students Passed at Final Examination
			1st Term	2d Term		
		PHILOSOPHY.				
Howison	1	I. PROPÆDEUTIC TO PHILOSOPHY. Empirical psychology, including formal logic, inductive and deductive. Lotze's *Outlines of Psychology*, translated by Ladd; Hill's *Jevons's Logic;* Howison's *Synopsis of Formal Logic, in Questions*	4	----	25 3 28	13 2 15
Howison	2	II. INTRODUCTION TO PHILOSOPHY. History of European philosophy in outline. Zeller's *Outlines of the History of Greek Philosophy;* Stirling's translation of Schwegler's *History of Philosophy*	----	4	20 3 23	18 3 21
------------	3	III. ELEMENTARY ETHICS, INCLUDING CIVIL POLITY. [Omitted.]	----	----	---- ----	-------
Howison	4	IV. THE ANCIENT AND THE MODERN DEVELOPMENT OF IDEALISM. Socrates, Plato, Aristotle; Berkeley, Hume, Leibnitz, Kant, Fichte, Schelling, Hegel. Zeller's *Outlines of the History of Greek Philosophy;* Stirling's translation of *Schwegler's History of Philosophy;* Fraser's *Selections from Berkeley;* Knight's *Hume;* Morris's *Kant's Critique;* Everett's *Fichte's Science of Knowledge;* Caird's *Hegel*	2	2	7 2 9	3 2 5
Howison	5	V*a*. PHILOSOPHY OF RELIGION: THE RATIONAL FOUNDATIONS OF THEISM. Critique of Mill's *Three Essays* and Kant's *Dialectic of Pure Reason;* Kant's *Critique of Pure Reason*, translated by Max Müller	----	2	7 1 8	3 0 3
------------	6	VI. GRADUATE COURSE. [Omitted.]	----	----	--------	-------
		HISTORY AND POLITICAL SCIENCE.				
Bacon	7	I. ENGLISH HISTORY. Special attention is directed to the history and political institutions of England in the seventeenth and eighteenth centuries. Bright's *History of England;* Lecky's *England in the XVIII. Century*	4 --	---- 4	38 10 48 35 10 45	29 9 38 28 6 34
Bacon	8	II. EUROPEAN HISTORY. The history of Continental Europe from the fifth century to the present time. Church's *Beginnings of the Middle Ages;* Johnson's *Normans in Europe;* Bryce's *Holy Roman Empire;* Hæusser's *Period of the Reformation;* Cox's *The Crusades;* Kitchen's *History of France;* Tuttle's *History of Prussia;* Fyffe's *Modern Europe*	4 --	--- 4	26 16 42 28 12 40	23 7 30 23 5 28
Jones	9	III. UNITED STATES HISTORY. (*a*) The social, political, and constitutional history of the Colonies. Shaler's *Physiography in North America*, in Winsor's *Narrative and Critical History of America*, Vol. IV., pp. 1 to 30; Masson's *Life and Times of Milton*, Vol. I., pp. 531 to 608; Lodge's *Short History of the English Colonies in America;* Frothingham's *Rise of the Republic;* Lecky's *England in the XVIII. Century*, Vol. III., Chap. XII.; Fisk's *Irving's Life of Washington;* Franklin's *Autobiography*	----	4	28 9 37	22 4 26

RECORD OF COURSES OF INSTRUCTION—Continued.

INSTRUCTOR.	Number.	TITLE AND DESCRIPTION OF COURSE.	No. of Hours a Week. 1st Term.	No. of Hours a Week. 2d Term.	No. of Students in Attendance.	No. of Students Passed at Final Examination.
		(*b*) History of the Revolution, of the Government under the Articles of Confederation, and of the formation of the Constitution; principles of constitutional law. Lecky's *England in the XVIII. Century;* Curtis's *Formation of the Constitution;* Bancroft's *Formation of the Constitution;* Pomeroy's *Constitutional Law;* Fisk's *Critical Period of American History;* Poole's *Dr. Cutler and the Ordinance of 1787*	4	----	20 7 27	11 7 18
		(*c*) Political and constitutional history from 1789 to 1860. Schouler's *History of the United States;* Von Holst's *History of the United States*, Vol. I., Chaps. VI. to X.; Johnston's Articles on United States History, in Lalor's Cyclopædia	----	4	21 6 27	18 5 23
Moses	10	IV. COMPARATIVE CONSTITUTIONAL HISTORY. A comparative view of the development and present condition of the political institutions of the western nations. Crane and Moses's *Politics;* Moses's *Federal Government of Switzerland;* Hearn's *The Government of England;* Dicey's *The Law of the Constitution*	4	----	41 7 48	35 4 39
Jones	11	V. HISTORY OF THE NINETEENTH CENTURY. A study of the principal social and political movements since the Congress of Vienna. Fyffe's *History of Modern Europe;* Maurice's *The Revolutionary Movement of 1848–49;* Müller's *Political History of Recent Times*	4	----	11 4 15	9 4 13
Moses	12	VI. POLITICAL ECONOMY. A general view of the principles and laws of political economy in its present position. Walker's *Political Economy;* Smith's *Wealth of Nations*	----	4	40 12 52	36 9 45
Moses	13	VII. ADVANCED POLITICAL ECONOMY. A critical study of the history of economic thought. Walker's *Political Economy;* Ingram's *History of Political Economy*	4	----	20 2 22	16 2 18
----	14	VIII. ROMAN LAW; JURISPRUDENCE. [Omitted.]	----	----	----	----
Jones	15	IX. CONSTITUTIONAL LAW OF THE UNITED STATES. Critical study of the leading judicial decisions on the Constitution. Patterson's *Federal Restraints on State Action; Reports of the Supreme Court of the United States*	----	----	----	----
Moses	16	X. HISTORY OF POLITICAL THEORIES. The history of political thought and its practical influence on institutions. Aristotle's *Politics;* Machiavelli's *Discourses on Livy;* Hobbes's *Leviathan*	----	4	21 2 23	20 2 22
Jones	17	XI. EUROPEAN POLITICS. A seminary study of contemporary events and affairs in Europe	----	2	10 4 14	10 4 14
		PHILOLOGY.				
Howard	18	I. LINGUISTICS. Whitney's *Language and the Study of Language*	2	----	3 1 4	3 1 4
Howard	19	II. COMPARATIVE PHILOLOGY. Lectures	----	2	2 0 2	2 0 2

RECORD OF COURSES OF INSTRUCTION—Continued.

INSTRUCTOR.	Number	TITLE AND DESCRIPTION OF COURSE.	No. of Hours a Week. 1st Term	No. of Hours a Week. 2d Term	No. of Students in Attendance		No. of Students Passed at Final Examination	
		GREEK.						
Senger	20	I. SELECTIONS FROM GREEK AUTHORS. Boise and Freeman's *Selections from Greek Authors*, containing portions of Homer's *Odyssey*, Herodotus, Thucydides, Xenophon's *Memorabilia*, Plato's *Phædo*, Arrian and Lucian; Demosthenes' *Third Olynthiac;* sight reading in the *Iliad.* Boise's *Exercises in Greek Syntax*	4	---	11 5	16	7 5	12
			--	4	10 5	15	6 5	11
Bunnell	21	II. PLATO, ÆSCHYLUS, EURIPIDES, SOPHOCLES. Plato's *Apology* and *Crito*, Æschylus' *Prometheus*, Euripides' *Alcestis* or *Hecabe*, Sophocles' *Antigone;* Euripides' *Medea* at sight	4	----	17 1	18	14 1	15
			--	4	14 1	15	14 1	15
Bunnell	22	III. SOPHOCLES, PLATO, LYSIAS, DEMOSTHENES. Sophocles' *Oedipus Tyrannus*, Plato's *Gorgias*, Lysias' select *Orations;* three *Philippics* of Demosthenes at sight. Lectures on Greek archæology	2	----	2 2	4	2 2	4
			--	3	1 3	4	1 2	3
Bunnell	23	IV. DEMOSTHENES, ÆSCHINES, ARISTOPHANES. Demosthenes' *Oration on the Crown*, Æschines' *Oration against Ctesiphon*, Demosthenes' *Oration against Leptines*, Lucian, Aristophanes' *Frogs*, *Clouds* or *Birds;* reading at sight	3	2	6 0	6	6 0	6
Bunnell	24	V. GREEK LITERATURE. Lectures. Jevons's *History of Greek Literature*	----	1	5 0	5	4 0	4
		LATIN.						
Deamer	25	I. LIVY, CICERO, HORACE. Chase's *Livy* (two books); Crowell's *De Senectute* and *De Amicitia* of Cicero; Thomas Chase's, or MacLeane's *Odes* of Horace; Abbott's *Latin Prose through English Idiom*	4	----	25 9	34	15 5	20
			----	4	24 7	31	14 5	19
Deamer	26	II. HORACE, CICERO, PLAUTUS, TERENCE. Chase and Stuart's, or MacLeane's *Satires and Epistles* of Horace; Chase and Stuart's *De Officiis* of Cicero; Morris's *Mostellaria* of Plautus; Crowell's *Andrea* of Terence	3	----	23 5	28	20 4	24
			--	3	22 5	27	20 5	25
Howard	27	III. CICERO, QUINTILIAN, JUVENAL, TACITUS. Smith's Cicero's *Brutus;* Quintilian's *Institutes; Satires* of Juvenal; Halm's Text of *Annals* of Tactitus; Kellogg's *Ars Oratoria*	5	----	7 6	13	5 4	9
			----	3	7 2	9	6 2	8
Howard	28	IV. CICERO, LUCRETIUS, VERGIL, ELEGIAC POETS. Stickney's Cicero's *De Natura Deorum;* Munro's Lucretius' *De Rerum Natura;* Harrington's *Captivi*, *Trinummus and Rudens* of Plautus; selections from Vergil, Catullus, etc.	2	----	4 2	6	4 2	6
			--	5	5 1	6	5 1	6
Howard	29	V. ROMAN ARCHÆOLOGY. Course based on Wilkins's *Roman Antiquities.* Wilkins's *Roman Antiquities*	---	1	18 7	25	17 3	20
Howard	30	VI. ROMAN LITERATURE. Course based on Cruttwell's *History of Roman Literature*	2	----	2 0	2	2 0	2

RECORD OF COURSES OF INSTRUCTION—Continued.

INSTRUCTOR.	Number	TITLE AND DESCRIPTION OF COURSE.	No. of Hours a Week.		No. of Students in Attendance		No. of Students Passed at Final Examination	
			1st Term	2d Term				
		ENGLISH.						
	31	I. ENGLISH PROSE STYLE. Study of English prose composition on the basis of Minto's *Manual of English Prose Literature*, and Lewes's *Principles of Success in Literature*.						
Bradley	----	Section 1	4	----	46 12	58	26 11	37
				4	41 10	51	24 10	34
Armes	----	Section 2	4	----	44 15	59	35 13	48
				4	39 12	51	25 10	35
Bradley	32	II. PREPARATION OF SUMMARIES. Exercises in abstracting and tabulating	1	----	33 2	35	22 2	24
Armes	33	III. HISTORY OF ENGLISH LITERATURE. A rapid survey of the whole field, followed by the study of representative authors in chronological order	3	----	42 19	61	38 13	51
Armes	34	IV. ENGLISH CLASSICS. A course in *Belles Lettres*, based upon selections from eminent poets and prose writers	----	3	39 14	53	32 8	40
Cook	35	V. SHAKESPEARE. Critical study of one or more plays	3	----	12 11	23	9 6	15
--------	36	VI. THE NOVEL. [Omitted.]	----	----	----	----	----	----
Cook	37	VII. BROWNING. Critical study of selected poems of Robert Browning	----	3	9 12	21	9 9	18
Bradley	38	VIII. OLD ENGLISH. Reading of simple prose; elements of Old English grammar as an introduction to the historical study of English. Cook's *Sievers' Old English Grammar;* Sweet's *Anglo-Saxon Reader*	----	3	7 4	11	7 4	11
Cook	39	IX. CHAUCER AND MIDDLE ENGLISH. Critical study of selected works of Chaucer; survey of Middle English literature; studies in phonology and syntax; dialectical variations; development of the language from the Old English period	3	----	3 0	3	3 0	3
Cook	40	X. LONGFELLOW'S TRANSLATION OF DANTE. A study of Dante's *Divine Comedy* as literature; its relation to his other works; its place in history and significance for the present age	3	----	4 7	11	3 7	10
Cook	41	XI. ADVANCED OLD ENGLISH; BEOWULF. Critical study of Beowulf; survey of Old English literature; lectures on Old English grammar	----	3	1 0	1	1 0	1
Cook	42	XII. MILTON. A critical study of Milton's character, opinions, and works	----	3	7 4	11	7 4	11
Cook	43	XIII. LITERARY MASTERPIECES. A course of reading to be pursued throughout the year under the advice and direction of the professor in charge	3	3	13 2	15	12 2	14
Armes	44	XIV. THEMES. *Freshman year:* Four themes each term required in all courses	**	----	98 17	115	75 10	85
			--	**	76 23	99	27 19	46
Bradley	----	*Sophomore year:* Four themes each term required in the Classical and Literary courses, and the course in Letters and Political Science; three themes each term required in all the Scientific courses	**	----	67 20	87	38 12	50
			--	**	65 14	79	39 9	48
Cook	----	*Junior year:* Two themes each term required in all courses	**	----	42 13	55	25 9	34
			--	**	39 7	46	21 6	27

Record of Courses of Instruction—Continued.

Instructor.	Number	Title and Description of Course.	No. of Hours a Week. 1st Term	No. of Hours a Week. 2d Term	No. of Students in Attendance	No. of Students Passed at Final Examination
Cook	----	*Senior year:* Two themes each term required in the Classical and Literary courses, and the course in Letters and Political Science	**	---	21 5 26	9 5 14
			--	**	21 5 26	12 4 16
		GERMAN.				
	45	I. Introductory Course. *First year:* The Joynes-Meissner *German Grammar*, with reference to other German Grammars; Boisen's *Preparatory Book of German Prose.*				
Putzker	----	Section 1	4	4	31 5 36	17 4 21
Senger	----	Section 2	4	----	28 2 30	22 2 24
			--	4	22 1 23	20 1 21
Putzker	----	*Second year:* Schiller. *Maria Stuart, Wilhelm Tell, Die Jungfrau von Orleans*, and perhaps other writings. Lectures on the topics under consideration; one exercise a week in grammar and syntax	4	4	31 14 45	20 9 29
----------	46	II. Middle High German. [Omitted.]	----	---	--------	--------
Senger	47	III. Goethe. In the class-room, selected masterpieces of Goethe, *e. g.*, *Hermann und Dorothea, Gœtz von Berlichingen, Iphigenie auf Tauris; Egmont;* Gœdeke's *Goethe's Leben;* lectures on the topics under consideration; written exercises. Outside of the class-room, the study of Schiller continued from the second year of Course I.	3	----	14 4 18	9 4 13
			--	3	11 3 14	10 3 13
Putzker	48	IV. Lessing. In the class-room, selected masterpieces of Lessing, *e. g.*, *Emilia Galotti, Minna von Barnhelm, Nathan der Weise;* Gœring's *Lessing's Leben;* lectures on the topics under consideration; written exercises. Outside of the class-room, the study of Goethe's works continued from Course III.; special work assigned in some cases	2	2	8 3 11	6 3 9
		FRENCH.				
Paget	49	I. Introductory Course. *First year;* Keetels' *Elementary French Grammar; Athalie.* A part of *Le Roi des Montagnes* read in the class; the remainder read outside of the class, for examination	4	----	48 18 66	32 7 39
			--	4	38 10 48	24 9 33
Paget	----	*Second year:* Keetels' *Elementary French Grammar; Horace; Discours sur le Style* (Buffon); *Hernani; Le Misanthrope. L'Abbé Constantin* and *L'Ami Fritz* read outside of the class, for examination. Further like work assigned as occasion requires	3	----	21 14 35	15 9 24
			--	3	22 12 34	17 10 27
Paget	50	II. Advanced Course. *First Year: Grammaire Française* (*cours supérieur*) by A. Chassang. The lectures on the French language continued, and a new series of lectures in French, on French literature begun	3	3	4 0 4	4 0 4
Paget	----	*Second year: Grammaire Française* (*cours supérieur*) by A. Chassang; French composition; reading at sight; lectures on French literature	2	2	3 2 5	1 1 2

Record of Courses of Instruction—Continued.

Instructor.	Number	Title and Description of Course.	No. of Hours a Week. 1st Term	No. of Hours a Week. 2d Term	No. of Students in Attendance	No. of Students Passed at Final Examination
		SPANISH.				
Paget	51	I. Introductory Course. Monsanto and Languellier's *Practical Course with the Spanish Language.* Reading matter assigned as occasion requires	3	3	14 3 17	4 0 4
		MATHEMATICS.				
	52	I. Solid and Spherical Geometry, Algebra, Trigonometry, Analytic Geometry.				
Edwards	---	(1) Solid and Spherical Geometry. Venable's *Elements of Geometry*	4	----	51 20 71	42 16 58
Edwards	----	(2) Algebra. Clarke's *Algebra*	----	4	54 17 71	34 10 44
		(3) Plane and Spherical Trigonometry and Analytic Geometry. Clarke's *Manual of Trigonometry;* C. Smith's *Conic Sections.*				
Clarke	----	Section 1	4	----	24 11 35	10 1 11
Edwards	----	Section 2	3	----	35 6 41	20 3 23
	53	II. Algebra, Trigonometry, Geometry, Differential Calculus.				
		(1) Algebra. Theory of equations, elements of the theory of determinants, discussion of series. Clarke's *Algebra;* Todhunter's *Theory of Equations*	3	----	41 2 43	25 2 27
Clarke	----	(2) Trigonometry. The development of the general formulæ of plane and spherical trigonometry, solution of plane and spherical triangles, the use of logarithmic tables, hyperbolic functions. Clarke's *Manual of Trigonometry*	----	3*	46 2 48	20 2 22
		(3) Synthetic Geometry. Resumé of the fundamental propositions of the Euclidian geometry of space, and a course in modern projective geometry. Venable's *Elements of Geometry.*				
Clarke	----	Section 1	3	----	16 1 17	9 1 10
Edwards	----	Section 2	3	----	19 1 20	16 1 17
Stringham	----	(4) Analytic Geometry and the differential calculus. (*a*) Equations of the straight line, the circle and the conic sections, including the discussion of the general equation of the second degree. (*b*) First principles of the differential calculus. C. Smith's *Conic Sections.* Lectures on the calculus	----	4†	36 2 38	15 2 17
Stringham	----	(5) Modern Methods in Elementary Mathematics. Some modern ways of treating familiar mathematical subjects. Phillips and Beebe's *Graphic Algebra;* Venable's *Introduction to Modern Geometry*	3	----	16 0 16	15 0 15
Edwards	54	III. Analytic Geometry. The straight line, the circle and the conic sections, treated by the analytical method. Supplementary to Course I. (2). Wood's *Elements of Coördinate Geometry*	----	2	6 1 7	6 1 7

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* One of these hours was devoted to exercises for which there was no previous assignment of lessons.

† Two of these hours were devoted to exercises for which there was no previous assignment of lessons.

RECORD OF COURSES OF INSTRUCTION—Continued.

INSTRUCTOR.	Number	TITLE AND DESCRIPTION OF COURSE.	No. of Hours a Week. 1st Term	No. of Hours a Week. 2d Term	No. of Students in Attendance	No. of Students Passed at Final Examination
	55	IV. DIFFERENTIAL AND INTEGRAL CALCULUS; ANALYTIC GEOMETRY OF THREE DIMENSIONS.				
Stringham	----	(1) The differential and integral calculus, with various applications. Rice and Johnson's *Differential Calculus*, abridged edition; Johnson's *Integral Calculus*	6*	----	29 1 30	15 1 16
Clarke	----	(2) The analytic geometry of space, involving methods of the differential calculus. C. Smith's *Solid Geometry*	---	6*	29 1 30	14 1 15
Stringham	56	V. DIFFERENTIAL AND INTEGRAL CALCULUS. Advanced course; a continuation of Course IV. Williamson's *Differential Calculus; Williamson's Integral Calculus*	2	2	3 0 3	2 0 2
	57	VI. CONIC SECTIONS. Advanced course. [Omitted.]	----	----	--------	--------
Clarke	58	VII. HIGHER PLANE CURVES. Continuation of Course VI., as given in 1887–88. Salmon's *Conic Sections;* Salmon's *Higher Plane Curves*	2	2	1 0 1	1 0 1
Stringham	59	VIII. DIFFERENTIAL EQUATIONS. Theory and methods of solution of total differential equations. Forsyth's *Differential Equations*	2	2	6 0 6	4 0 4
Stringham	60	IX. METHOD OF LEAST SQUARES. The fundamental principles and processes of the method of least squares, and their application to the problems involved in the reduction of astronomical and physical observations. Merriman's *Text-Book of the Method of Least Squares*	2	----	12 0 12	12 0 12
Slate	61	X. ANALYTIC MECHANICS. (*a*) The mathematical treatment of the important principles of dynamics and statics, fully illustrated by problems and applications	4	4	15 0 15	11 0 11
Slate	----	(*b*) Course supplementary to the preceding	2	2	8 0 8	3 0 3
Hesse	62	XI. HYDRODYNAMICS. Investigations in the action of forces upon liquid bodies, either in producing equilibrium (hydrostatics) or motion (hydrodynamics), such as pressure, stability, flow through orifices, pipes, etc., under the influence of gravity, inertia, outer and inner friction	4	---	6 0 6	6 0 6
Edwards	63	XII. QUATERNIONS. An elementary presentation of the principles of the subject, with illustrations of its applications to geometery and mechanics. Hardy's *Elements of Quaternions*	2	2	3 0 3	3 0 3
--------------	64	XIII. MODERN METHODS IN GEOMETRY. After Reye, Cremona and Poncelet. [Omitted.]	----	----	--------	--------
------- ------	65	XIV. DIFFERENTIAL AND INTEGRAL CALCULUS. An elementary course for students in non-scientific courses. [Omitted.]	----	----	--------	--------

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* Three of these hours were devoted to exercises for which there was no previous assignment of lessons.

RECORD OF COURSES OF INSTRUCTION—Continued.

INSTRUCTOR.	Number	TITLE AND DESCRIPTION OF COURSE.	No. of Hours a Week.		No. of Students in Attendance		No. of Students Passed at Final Examination	
			1st Term	2d Term				
		PHYSICS.						
John LeConte	66	I. GENERAL PHYSICS. Lectures, with experimental illustrations, on Mechanics, Heat, Light, Magnetism, Electricity and Sound	4	----	59 11	70	55 10	65
			--	4	35 1	36	31 1	32
----------	67	II. ADVANCED COURSE IN GENERAL PHYSICS. [Omitted.]	----	----	----	----	----	----
----------	68	III. THERMODYNAMICS. [Omitted.]	----	----	----	----	----	----
----------	69	IV. THE PHYSICS OF METEOROLOGY. [Omitted.]	----	----	----	----	----	----
----------	70	V. THEORY OF VISION. [Omitted.]	----	----	----	----	----	----
Slate	71	VI. PHYSICAL LABORATORY. Exercises connected with the subject of chemical philosophy, as pursued by students of agriculture and chemistry, such as: Vapor-density determinations by the methods of Meyer, Dumas, Hofman; determinations of boiling point, specific heat, heat developed in chemical reactions, specific gravity; galvanic measurements connected with electrolysis	----	3	4 0	4	4 0	4
Slate	72	VII. PHYSICAL LABORATORY: PROBLEMS. Selected physical problems, involving mathematical and experimental work, such as: Experimental determination of the moment of inertia, and of the focal length and the curvature of lenses; measurements of galvanic resistance, and of electro-motive force and intensity; determination of the modulus of elasticity, and of the coefficient of expansion by heat	---	3	13 0	13	13 0	13
Slate	73	VIII. PHYSICAL LABORATORY: PROBLEMS. A continuation of Course VII., consisting of more advanced problems, involving accurate measurement and more extended knowledge. The scope of this work is varied and enlarged according to the capacity of the student and the time at his disposal	6	----	5 0	5	5 0	5
			--	6	1 0	1	1 0	1
		ASTRONOMY.						
Soulé	74	I. GENERAL ASTRONOMY. General facts and principles underlying the science of astronomy, physical and spherical, with solutions of many problems, particularly those relating to the determination of latitude, longitude, time, etc. Newcomb and Holden's *Astronomy*	3	----	8 2	10	6 2	8
Soulé	75	II. PRACTICAL ASTRONOMY AND NAVIGATION. A continuation and completion of the preceding course. Astronomy: Doolittle's *Astronomy*. Geodesy: Clarke's *Geodesy*. Navigation and Nautical Astronomy: Theory of the different methods of determining a ship's place and laying its course, including practice with the sextant. Practical work in the observatory	4	7	4 0	4	3 0	3

RECORD OF COURSES OF INSTRUCTION—Continued.

INSTRUCTOR.	Number.	TITLE AND DESCRIPTION OF COURSE.	No. of Hours a Week.		No. of Students in Attendance.		No. of Students Passed at Final Examination.	
			1st Term.	2d Term.				
		CHEMISTRY.						
	76	I. ELEMENTARY CHEMISTRY. Recitations and lectures, fully illustrated by experiments. Eliot and Storer's *Elementary Manual*, and Roscoe's *Elementary Chemistry* (Inorganic part).						
Rising	----	Section 1	----	3	26 10	36	23 10	33
O'Neill	----	Section 2	----	4	29 2	31	20 2	22
Rising	77	II. EXPERIMENTAL LECTURES ON INORGANIC CHEMISTRY. Roscoe and Schorlemmer's *Manual of Chemistry*, read in connection with the lectures	3	3	29 1	30	27 1	28
Rising	78	III. CHEMICAL PHILOSOPHY. *First term:* Recitations in Cooke's text-book on the subject, supplemented by notes and explanations. *Second term:* Short courses of lectures on thermo-chemistry, electrolysis and spectrum analysis	2	2	5 0	5	5 0	5
Rising	79	IV. LECTURES ON ORGANIC CHEMISTRY. Richter's *Organische Chemie*, used as a work of reference. One hour a week, extra and optional, was devoted to the reading and explanation of the work of reference	2	2	8 1	9	4 1	5
O'Neill	80	V. LABORATORY: QUALITATIVE ANALYSIS. General principles of qualitative analysis, characteristic reactions and tests for bases and acids; analysis of simple and complex salts and mixtures; examination of substances in common use, or of domestic importance, for impurities or adulterations. Special attention is given to the general relations of the elements, and to synthetic preparations	12	8	31 1	32	26 1	27
Rising	81	VI. LABORATORY: QUANTITATIVE ANALYSIS. Gravimetric and volumetric analysis of ores, minerals, etc.; practice in the preparation of organic and inorganic compounds; organic analysis; special investigations; methods of analysis	15	----	12 1	13	11 1	12
			--	15	11 1	12	10 1	11
O'Neill	82	VII. PHYSIOLOGICAL CHEMISTRY. A course of lectures, embracing a general consideration of organisms; relation to external conditions, atmospheric pressure, etc.; inorganic and organic constituents of organisms; chemistry of animal tissues and fluids; physiological functions and processes, digestion, nutrition, excretion, respiration, etc. Laboratory practice in the preparation of physiological products; test for blood and bile constituents; urine analysis; milk analysis. Works of reference: Gamgee's *Chemistry of Animal Functions*, Hoppe-Seyler's *Physiologische Chemie*	----	3	7 0	7	5 0	5
O'Neill	83	VIII. BLOWPIPE ANALYSIS: QUALITATIVE. Cornwall's or Landauer's Blowpipe Analysis. Laboratory practice	----	4	30 1	31	25 1	26
Rising	84	IX. BLOWPIPE ANALYSIS: QUANTITATIVE	----	----	----	----	----	----
----	85	X. MODERN THEORIES IN CHEMISTRY. [Omitted.]	----	----	----	----	----	----

RECORD OF COURSES OF INSTRUCTION—Continued.

INSTRUCTOR.	Number.	TITLE AND DESCRIPTION OF COURSE.	No. of Hours a Week.		No. of Students in Attendance.		No. of Students Passed at Final Examination.	
			1st Term.	2d Term.				
		BOTANY.						
Greene	86	I. VEGETAL STRUCTURE AND MORPHOLOGY. Lectures, illustrated as fully as possible by living specimens, and recitations from Bastin's *Elements of Botany*	3	----	5 1	6	4 1	5
Greene	87	II. SYSTEMATIC AND ECONOMIC BOTANY. Practical exercises in the determination of genera and species of the California flora; lectures on plants of commercial value, and on those useful or injurious to agriculture in California. Botany of State Geological Survey and Gray's *Synoptical Flora of North America*	----	3	5 2	7	5 2	7
Greene	88	III. ADVANCED SYSTEMATIC BOTANY. Special studies in the different phanerogamic natural orders, involving the determination and classification of specimens	3	3	2 0	2	2 0	2
		ZOÖLOGY.						
Jos. Le Conte	89	I. COMPARATIVE ZOÖLOGY. Lectures. The course is essentially one of comparative physiology. *First term:* Organs and functions of animal life, *i. e.*, nervous systems, sense organs, muscular and skeleton systems. *Second term:* Organs and functions of vegetative life, *i. e.*, digestive, circulatory, respiratory and excretory systems	2	----	69 9	78	57 4	61
			--	2	43 6	49	38 5	43
		GEOLOGY.						
Jos. Le Conte	90	I. GEOLOGY. *First term:* Dynamical and structural geology. *Second term:* Historical geology	3	----	42 5	47	33 4	37
			--	3	41 5	46	36 4	40
----	91	II. PETROGRAPHY. [Omitted.]	----	----	----		----	
----	92	III. PETROGRAPHICAL LABORATORY. [Omitted.]	----	----	----		----	
----	93	IV. ECONOMIC GEOLOGY. [Omitted.]	----	----	----		----	
		MINERALOGY.						
Jackson	94	I. CRYSTALLOGRAPHY, MINERALOGICAL TERMINOLOGY AND DESCRIPTIVE MINERALOGY. The *crystallography* is treated with the view of enabling the student to determine natural crystals at sight, or at most with the use of the contact-goniometer; only descriptive crystallography is treated. The *mineralogical terminology* deals with all of the physical properties of minerals that are used in determinative work, such as lustre, color, streak, optical reactions in polarized light, cleavage, fracture, hardness, etc. The *descriptive mineralogy* treats in detail of the crystallographic, physical, chemical and geological properties of all geologically or economically important minerals	2	2	12 1	13	*	

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* Examination held in connection with that for Course II. of the succeeding year.

Record of Courses of Instruction—Continued.

Instructor.	Number	Title and Description of Course.	No. of Hours a Week.		No. of Students in Attendance		No. of Students Passed at Final Examination	
			1st Term	2d Term				
Jackson	95	II. Mineralogical Laboratory. Determination of unlabeled minerals by means of their physical properties only, the apparatus consisting of penknife, pocket lens, streak-plate and magnet. The object is to give the student sufficient familiarity with the most commonly occurring minerals of geological and economic importance to enable him to recognize or determine them in the field without delay	4	4	7 1	8	5 1	6*
----	96	III. Theoretical Crystallography and Crystallophysics. [Omitted.]	----	---	----	----	----	----
		MECHANICAL ENGINEERING.						
Hesse	97	I. Hydraulics: Hydraulic Motors, Pumps, Water Engines. And, in general, such machines and apparatus as operate through the agency of fluids, either in modifying motion or transmitting power	----	2	3 0	3	2 0	2
Hesse	98	II. Kinematics. *Theoretical:* Treatment of motion without reference to the cause which produces it, comprehending the study of pure mechanism, or the mutual dependence of the movements in the parts of a machine. *Applied:* Application of the preceding to the various kinematic problems connected with machine construction, such as link-motion, transmission by rolling and sliding contact, teeth of wheels, cams, etc.	2	2	3 0	3	2 0	2
Hesse	99	III. Thermodynamics. Mechanical theory of heat, and its application to the theory and construction of motors; of steam, gas, and hot-air engines; of ice-machines; and of air-compressors for transmission of power	2	2	3 0	3	2 0	2
Hesse	100	IV. General Machine Construction	----	4	3 0	3	2 0	2
Hesse	101	V. Laboratory: Construction and Experimenting	----	----	----	----	----	----
		CIVIL ENGINEERING.						
W. G. Raymond	102	I. Surveying. Johnson's *Theory and Practice of Surveying*, supplemented by lectures on mine and railroad surveying, and on the theory and use of the plane-table. The instruction includes the theory and use of all modern instruments employed by surveyors in field and office work, together with field methods of making land, topographical, hydrographical, mine, railroad, canal, and city surveys, and the mapping of the same; surveys for the calculation of earthwork; the theory and use of diagrams for computing earthwork and masonry	4 --	---- 4	12 0 10 0	12 10	8 0 6 0	8 6

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*Examination covered Course I. of the preceding year.

RECORD OF COURSES OF INSTRUCTION—Continued.

INSTRUCTOR.	Number	TITLE AND DESCRIPTION OF COURSE.	No. of Hours a Week.		No. of Students in Attendance	No. of Students Passed at Final Examination
			1st Term	2d Term		
W. G. Raymond	103	II. FIELD PRACTICE AND MAPPING. Adjustment of instruments. Practice in plane and topographical surveying. Preliminary and location surveys for a line of railroad, together with the staking-out of the work, the making of estimates, etc. Finished maps of all surveys are required	9	9	10 0 10	7 0 7
Soulé	104	III. STRENGTH OF MATERIALS. Character and properties of building materials, such as iron, steel, other metals, timber, natural and artificial stones; practice in the selection of good specimens and the detection of poor ones. Discussions of the elastic and ultimate resistances of these materials; deduction of formulæ for safe and for rupturing loads of beams, etc.; designs of beams of uniform strength; discussion, by both analytical and graphical methods, of torsive stresses, plane of maximum shear, and internal strains. Lectures and numerous problems. Burr's *Elasticity and Strength of Materials of Construction*	4	----	8 0 8	7 0 7
Soulé	105	IV. ENGINEERING STRUCTURES. Theory of joints, and of framing in wood and iron; boiler-plate joints. Theory and construction of solid and open-built girders, of roof trusses, bridge trusses, and railway bridges generally. Theory of suspension bridges, and of foundations on land and under water. Lectures and Problems. Wood's *Bridges and Roofs;* Du Bois' *Strains on Ground Structures;* Burr's *Bridges*	----	4	3 0 3	2 0 2
Soulé	106	V. SANITARY ENGINEERING. Recitations and lectures on the practical construction of works for water-supply and sewerage of cities, and for drainage of agricultural lands. Fanning's *Water-Supply;* Adams's *Sewers*	----	4	4 0 4	2 0 2
Soulé	107	VI. ENGINEERING SPECIFICATIONS AND CONTRACTS. Including the law of contracts as affecting the civil engineer, his obligations, guaranties, etc.; also, the forms of specifications best suited to contracts for roofs; for framed works; for trussed, arched or suspension bridges; for foundations of structures on land or under water; and for structures of masonry. Haupt's *Specifications and Contracts*	----	2	1 0 1	1 0 1

RECORD OF COURSES OF INSTRUCTION—Continued.

INSTRUCTOR.	Number	TITLE AND DESCRIPTION OF COURSE.	No. of Hours a Week. 1st Term	No. of Hours a Week. 2d Term	No. of Students in Attendance		No. of Students Passed at Final Examination	
		MINING, METALLURGY AND ASSAYING.						
Christy	108	I. MINING. Lectures: Relation of mining to other arts. Nature and occurrence of ores. Mining laws of the United States and Mexico. Location of claims. Prospecting; artesian and diamond-drill boring. Excavation; explosives and blasting. Tunneling: Systems of excavation and timbering. Shaft sinking: Systems of excavation and timbering; special methods for wet ground, such as tubbing, walling and boring. Winning and exploration of deposits. Exploitation: (1) Deep mining, methods of excavating and supporting used for working veins, beds and masses; (2) Open-cut work, quarries, peat and lake deposits, placers and hydraulic mining. Systems of tramming, hoisting, draining, pumping, lighting and ventilating. General organization and administration	3	3	7 0	7	3 0	3
Christy	109	II. METALLURGY. Lectures: *General Part:* Relation of metallurgy to mining and other arts. Classification of ores, and methods of their reduction. Ore crushing: Rock-breakers, rolls, stamps, grinding and pulverizing machines. Sampling of ores and products. Fuels, and their relative value as heat-producers. Furnace construction and classification. Fluxes and refractory materials. Metallurgical products. *Special Part:* In view of the local importance of the metallurgy of gold, silver, lead and quicksilver, the second term is devoted to a detailed study of methods in successful use for the reduction of the ores of these metals. In order to give the other metals the prominence which their importance demands, their treatment is reserved for the graduate courses	3	3	8 0	8	2 0	2
Christy	110	III. ASSAYING. Lectures and laboratory practice: Cupellation of gold and silver. Scorification assays of gold and silver ores. Crucible method for these ores. Parting gold and silver. Oxidizing and chloridizing, roasting and leaching of gold and silver ores. Humid assay of silver bullion. Fire assays of ores of lead, antimony, tin, nickel, cobalt, copper, iron and fuels. Volumetric and electrolytic methods with copper, nickel, cobalt	6	6	11 0	11	7 0	7
Christy	111	IV. METALLURGICAL LABORATORY. Experiments, on a working scale, in the crushing, sampling, concentration, roasting, leaching and amalgamation of gold and silver ores	....	6	7 0	7	7 0	7

RECORD OF COURSES OF INSTRUCTION—Continued.

INSTRUCTOR.	Number	TITLE AND DESCRIPTION OF COURSE.	No. of Hours a Week.		No. of Students in Attendance	No. of Students Passed at Final Examination
			1st Term	2d Term		
		AGRICULTURE, HORTICULTURE AND ENTOMOLOGY.				
Hilgard	112	I. AGRICULTURAL CHEMISTRY. *First Term:* Chemistry of plants and of their products. Nutrition of plants from atmospheric sources. Inorganic ingredients of plants, their importance and derivation; ash analysis. Physics of plants; mechanism of nutrition and movement of the juices. Germination and development of plants, and accompanying chemical changes. *Second Term:* Chemistry and physics of soils; their origin, formation, classification. Physical properties; their determination and influence; mechanical analysis. Chemical composition; relation to vegetable nutrition. Chemical analysis; its methods, utility and interpretation. Policy of culture and maintenance of fertility; exhaustion of soils by irrational culture; rotation of crops, green-manuring, subsoiling, thorough-drainage, irrigation; manures, their kinds, preparation, use and value; the rational system of culture. General summary	3	3	12 0 12	11 0 11
Wickson	113	II. ELEMENTARY AND ECONOMIC ENTOMOLOGY. Demonstrations both from typical collections and from living specimens. Field and orchard studies of both injurious and beneficial insects, and practical demonstration of the application and effects of various insecticides. Special instruction in the use of the microscope in identifying minute insects injurious to plants, and diseases caused by vegetable parasites	1	----	8 0 8	6 0 6
			--	1	9 0 9	8 0 8
Wickson	114	III. AGRICULTURE AND HORTICULTURE. Stock-breeding, dairying, fruit-culture, and methods of farming. Under the last head attention is directed to methods of culture, farm implements and machinery, practice of irrigation and drainage, and general field crops. The instruction in horticulture extends through the year, touching upon particular topics when they are most seasonable. Stock-breeding and dairying occupy the first term; and dairying, methods of farming, and staple crops, the second term. Three times a week, with occasional excursions occupying an entire day or half a day	3	----	3 0 3	3 0 3
			--	3	5 0 5	4 0 4
Hilgard	115	IV. VITICULTURE. A short special course in the chemistry and analysis of musts and wines, and in practical vinification, is given during the vintage season, from September to the Christmas vacation, in the Agricultural Experiment-Station Building, just completed. Its laboratory and cellars afford ample room and greatly increased facilities for work, both practical and theoretical. The lectures are adapted as nearly as possible to the needs of the classes, and are supplemented by daily work in the laboratory and cellars	2	----	7 0 7	7 0 7

RECORD OF COURSES OF INSTRUCTION—Continued.

INSTRUCTOR.	Number	TITLE AND DESCRIPTION OF COURSE.	No. of Hours a Week. 1st Term	No. of Hours a Week. 2d Term	No. of Students in Attendance	No. of Students Passed at Final Examination
Jaffa and Colby	116	V. AGRICULTURAL AND VITICULTURAL LABORATORY. This laboratory is devoted primarily to the prosecution of chemical and physical researches in relation to general agriculture; such as the mechanical and chemical examination of soils, waters, agricultural products, natural and commercial fertilizers, etc., and the determination of technical questions relating to agricultural processes or manufactures. The results of this work are reported to the persons interested; and are published, currently in the form of bulletins, ultimately in the form of annual reports. In order to supply the demand for special instruction in the analysis and investigation of agricultural materials and products, desk room in the laboratories for ten advanced and special students has been provided. They will be assigned such special work as may best suit their future professional pursuits	12	----	9 0 9	7 0 7
			--	12	9 0 9	8 0 8
		MECHANICAL DRAWING AND MAPPING.				
Kower	117	I. INSTRUMENTAL DRAWING AND DESCRIPTIVE GEOMETRY. Drawing of simple patterns, descriptive geometry, perspective, isometric projection, shades and shadows, etc.	3	3	29 1 30	18 1 19
W. G. Raymond	118	II. MAPPING. Topographical, mining, and railroad mapping and topographical modeling	6	----	11 0 11	9 0 9
			--	6	9 0 9	8 0 8
Kower	119	III. MECHANICAL DRAWING. Drawing of simple machine parts	6	6	22 0 22	13 0 13
Kower	120	IV. GRAPHOSTATICS. Graphical analysis of stresses in engineering structures	----	2	16 0 16	13 0 13
Kower	121	V. CONSTRUCTION. Including the designing of engineering structures and machines	9	----	9 0 9	7 0 7
			--	9	9 0 9	3 0 3
W. G. Raymond	122	VI. ELEMENTS OF INDUSTRIAL DRAWING. Geometrical drawing, topographical conventionalities, pen-work, brush-work, lettering	----	3	17 0 17	11 0 11
		MILITARY SCIENCE.				
Harrison	----	I. TACTICAL INSTRUCTION IN THE FIELD	2	2	202 0 202	--------
Harrison	----	II. TARGET PRACTICE	---	----	--------	--------
Harrison	123	III. A BRIEF COURSE IN MILITARY SCIENCE, including engineering and fortifications, strategy and tactics, ordnance and gunnery, military law, courts and boards, modern improvements in the art of war, and a study of great battles	1	1	19 0 19	19 0 19
		PHYSICAL CULTURE.				
Magee	----	EXERCISES IN HARMON GYMNASIUM	----	2½	153 0 153	103 0 103

RECORD OF COURSES OF INSTRUCTION FOR THE YEAR 1889–90.

NOTE.—In the columns showing number of students, the upper figures on the left refer to young men, the lower to young women; the numbers on the right side are the totals.

INSTRUCTOR.	Number	TITLE AND DESCRIPTION OF COURSE.	No. of Hours a Week.		No. of Students in Attendance		No. of Students Passed at Final Examination	
			1st Term	2d Term				
		PHILOSOPHY.						
Howison	1	I. PROPÆDEUTIC TO PHILOSOPHY. Empirical psychology, including formal logic, inductive and deductive. Lotze's *Outlines of Psychology*, translated by Ladd; Hill's *Jevons' Logic;* Howison's *Synopsis of Formal Logic, in Questions*	4	----	27 11	38	15 4	19
Howison	2	II. INTRODUCTION TO PHILOSOPHY. History of European philosophy, in outline. Zeller's *Outlines of the History of Greek Philosophy;* Stirling's translation of Schwegler's *History of Philosophy*	----	4	17 5	22	17 4	21
Howison	3	III. ELEMENTARY ETHICS, INCLUDING CIVIL POLITY. Sketch of the history of ethical and political theories; critique of the conflict between perfectionism and hedonism, freedom and necessity, optimism and pessimism; investigation of the nature of a state, and of its bearing on the limits of liberty and allegiance. Sidgwick's *Outlines of the History of Ethics;* Bluntschli's *Theory of the State*	4	----	14 3	17	13 1	14
Howison	4	IV. PHILOSOPHY FROM KANT TO HEGEL. The development of rationalistic idealism, from its negative and partial to its complete and positive form. Watson's *Philosophy of Kant;* Everett's *Fichte's Science of Knowledge;* Watson's *Schelling's Transcendental Idealism;* Caird's *Hegel;* Hegel's *Logic*, translated by Wallace; Seth's *The Development from Kant to Hegel*	2	2	11 3	14	10 2	12
Howison	5	V. KANT'S PRACTICAL PHILOSOPHY. Exposition and criticism of the system. Abbott's *Kant's Theory of Ethics*	----	4	12 2	14	9 1	10
Howison	6	VI. GRADUATE COURSE. Seminary study of Kant's *Critique of Pure Reason*, on the basis of Max Müller's translation. Kant's *Critique of Pure Reason*, translated by Max Müller	3¾	3¾	4 2	6	3 1	4
		HISTORY AND POLITICAL SCIENCE.						
Bacon	7	I. ENGLISH HISTORY. Special attention directed to the history and political institutions of England in the seventeenth and eighteenth centuries. Bright's *History of England;* Lecky's *History of England in the Eighteenth Century*	4 --	---- 4	44 16 39 11	60 50	32 10 30 11	42 41
Bacon	8	II. EUROPEAN HISTORY. The history of Continental Europe from the fifth century to the present time. Church's *Beginnings of the Middle Ages;* Johnson's *Normans in Europe;* Bryce's *Holy Roman Empire;* Hæusser's *Period of the Reformation;* Cox's *The Crusades;* Kitchen's *History of France;* Tuttle's *History of Prussia;* Fyffe's *Modern Europe*	4 --	---- 4	27 11 27 8	38 35	21 6 22 6	27 28

Record of Courses of Instruction—Continued.

Instructor.	Number.	Title and Description of Course.	No. of Hours a Week.		No. of Students in Attendance.	No. of Students Passed at Final Examination.
			1st Term.	2d Term.		
Jones	9	III. United States History. (*a*) The social, political and constitutional history of the colonies, history of the Revolution. Shaler's *Physiography in North America*, in Winsor's *Narrative and Critical History of America*, Vol. IV., pp. 1 to 30; Masson's *Life and Times of Milton*, Vol. II., pp. 531 to 608; Lodge's *Short History of the English Colonies in America;* Frothingham's *Rise of the Republic;* Lecky's *England in the Eighteenth Century*, Vol. III., Chap. XII.; Fiske's *Irving's Life of Washington;* Franklin's *Autobiography*	----	4	25 7 32	21 6 27
		(*b*) History of the Government under the Articles of Confederation, and of the formation of the Constitution; principles of constitutional law. Fiske's *Critical Period of American History;* Curtis' *History of the Constitution;* Jones' *Papers and References on the Formation of the Federal Constitution;* Pomeroy's *Introduction to Constitutional Law*	4	----	25 7 32	19 1 20
		(*c*) Political and constitutional history from 1789 to 1860. Schouler's *History of the United States;* Von Holst's *History of the United States*, Vol. I., Chap. VI. to X.; Johnston's Articles on United States History in Lalor's Cyclopædia	----	4	22 4 26	22 4 26
Moses	10	IV. Comparative Constitutional History. A comparative view of the development and present condition of the political institutions of the western nations. Crane and Moses' *Politics;* Moses' *Federal Government of Switzerland;* Hearn's *The Government of England;* Dicey's *The Law of the Constitution*	4	----	20 11 31	16 7 23
Moses	11	V. Political Economy. A general view of the principles and laws of political economy in its present position. Walker's *Political Economy;* Ingram's *History of Political Economy;* Smith's *Wealth of Nations*	----	4	33 11 44	29 9 38
Moses	12	VI. Advanced Political Economy. A critical study of the history of economic thought. Walker's *Political Economy;* Ingram's *History of Political Economy*	4	----	26 4 30	26 4 30
Jones	13	VII. Roman Law; Jurisprudence. History of the development of the public and private law of the Romans; systematic and historical exposition of Roman Law, with comparative views of the chief modern systems; the science of positive law. Hunter's *A Systematic and Historical Exposition of Roman Law;* Holland's *Jurisprudence*	4	----	12 0 12	11 0 11
Jones	14	VIII. Constitutional Law of the United States. Critical study of the leading judicial decisions on the Constitution. Patterson's *Federal Restraints on State Action; Reports of the Supreme Court of the United States*	----	2	12 0 12	12 0 12
Moses	15	IX. History of Political Theories. The history of political thought and its practical influence on institutions. Aristotle's *Politics;* Machiavelli's *Discourses on Livy;* Hobbes's *Leviathan*	----	4	23 4 27	23 4 27

RECORD OF COURSES OF INSTRUCTION—Continued.

INSTRUCTOR.	Number	TITLE AND DESCRIPTION OF COURSE.	No. of Hours a Week.		No. of Students in Attendance		No. of Students Passed at Final Examination	
			1st Term	2d Term				
Moses	16	X. POLITICAL SCIENCE. A course of graduate study in the science of politics. Once in two weeks, in sessions of two hours	----	1	--------		-------	
		PHILOLOGY.						
Howard	17	I. LINGUISTICS. Whitney's *Language and the Study of Language*	2	----	2 3	5	2 3	5
Howard	18	II. COMPARATIVE PHILOLOGY. Lectures	----	2	1 3	4	0 3	3
		GREEK.						
Senger	19	I. SELECTIONS FROM GREEK AUTHORS. Boise and Freeman's *Selections from Greek Authors*, containing portions of Homer's *Odyssey*, Herodotus, Thucydides, Xenophon's Memorabilia, Plato's *Phædo*, Arrian and Lucian, Demosthenes' *Third Olynthiac*, sight reading in the *Iliad*, Greek composition Boise's *Exercises in Greek Syntax*	4	4	15 1	16	14 1	15
*Pennell Bunnell	20	II. PLATO, ÆSCHYLUS, EURIPIDES, SOPHOCLES. Plato's *Apology* and *Crito*, Æschylus' *Prometheus*, Euripides' *Alcestis* or *Hecabe*, Sophocles' *Antigone*, Euripides' *Medea* at sight	4	----	8 4	12	7 3	10
			--	4	8 3	11	7 3	10
*Pennell Bunnell	21	III. SOPHOCLES, PLATO, LYSIAS, DEMOSTHENES. Sophocles' *Oedipus Tyrannus*, Plato's *Gorgias*, Lysias' *Select Orations;* three *Philippics* of Demosthenes at sight; lectures on Greek archæology	2	----	5 1	6	3 0	3
			--	3	4 1	5	4 0	4
*Pennell Bunnell	22	IV. DEMOSTHENES, ÆSCHINES, ARISTOPHANES. Demosthenes' *Oration on the Crown*, Æschines' *Oration against Ctesiphon*, Demosthenes' *Oration against Leptines*, Lucian, Aristophanes' *Frogs*, *Clouds* or *Birds;* reading at sight	3	2	1 2	3	1 2	3
Bunnell	23	V. GREEK LITERATURE. Lectures. Gerome's *History of Greek Literature*	----	1	3 2	5	2 2	4
		LATIN.						
Richardson	24	I. LIVY, CICERO, HORACE. Chase's *Livy* (two books); Kelsey's Cicero's *De Senectute;* Thomas Chase's, or MacLeane's *Odes* of Horace; Fleckeisen's Terence's *Phormio*	4	----	26 14	40	24 11	35
			--	4	25 14	39	22 7	29
Richardson	25	II. HORACE, CICERO, PLAUTUS, TERENCE. Chase and Stuart's, or MacLeane's *Satires and Epistles* of Horace; Crowell's Cicero's *De Officiis;* Morris' *Mostellaria* of Plautus; Fleckeisen's text of the Plays of Terence	3	----	16 5	21	15 5	20
			--	3	15 5	20	14 4	18
Howard	26	III. PLINY, SUETONIUS, TACITUS. *Epistles* of Pliny; C. L. Roth's Suetonius' *Lives of the Cæsars;* Halm's *Annals* of Tacitus	5	----	7 1	8	7 1	8
			--	3	5 3	8	5 2	7
Howard	27	IV. CICERO, LUCRETIUS, PLAUTUS, VERGIL. Stickney's Cicero's *De Natura Deorum;* Munro's Lucretius' *De Rerum Natura;* Fleckeisen's *Comedies* of Plautus; Vergil's *Æneid* studied critically	2	----	4 3	7	4 3	7
			--	5	3 2	5	3 2	5

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*During the first term, on account of the illness of Professor Bunnell.

RECORD OF COURSES OF INSTRUCTION—Continued.

INSTRUCTOR.	Number.	TITLE AND DESCRIPTION OF COURSE.	No. of Hours a Week.		No. of Students in Attendance.		No. of Students Passed at Final Examination.	
			1st Term.	2d Term.				
Howard	28	V. ROMAN ARCHÆOLOGY. Lectures; Wilkins' *Roman Antiquities*	....	1	10 5	15	9 5	14
Howard	29	VI. ROMAN LITERATURE. Course based on Cruttwell's *History of Roman Literature*	2	....	1 1	2	1 1	2
		ENGLISH.						
	30	I. (*a*) ENGLISH PROSE STYLE. Study of English prose composition on the basis of Minto's *Manual of English Prose Literature* and Lewes' *Principles of Success in Literature.*						
Armes	....	Section 1	4	....	23 6	29	17 4	21
			..	4	20 6	26	20 5	25
Armes	....	Section 2	4	....	45 0	45	33 0	33
			..	4	40 0	40	34 0	34
Hubbard	....	Section 3	4	....	19 8	27	13 6	19
			..	4	15 12	27	12 11	23
Hubbard	....	Section 4	4	....	27 16	43	21 15	36
			..	4	28 9	37	21 6	27
Armes	....	(*b*) THE DEVELOPMENT OF ENGLISH PROSE STYLE. Critical study of the leading English prose writers from 1300 to 1700, on the basis of Minto's *Manual of English Prose Literature*, Part II.	1	....	4 0	4	4 0	4
Armes	31	II. SUMMARIES. Training in reading, note-taking, and rapid reproduction of the matter presented	1	....	46 1	47	37 0	37
		[Course III. not offered in 1889–90.]						
Bradley	32	IV. OLD ENGLISH. Reading of simple prose; elements of Old English Grammar as an introduction to the historical study of English. Cook's Sievers' *Old English Grammar*; Sweet's *Anglo-Saxon Reader*	3	....	1 5	6	1 3	4
Bradley	33	V. ADVANCED OLD ENGLISH: BEOWULF. Critical study of Beowulf; survey of Old English literature; lectures on Old English grammar. Harrison and Sharp's *Beowulf*; Sweet's *Anglo-Saxon Reader*	....	3	1 3	4	1 3	4
....	34	VI. MIDDLE ENGLISH. [Omitted.]	....	....	....	....	....	....
Bradley	35	VII. ENGLISH LITERATURE; Chaucer and his contemporaries. Critical study of selected works. Morris' *Prologue and Knight's Tale*; Skeat's *Vision of Piers the Plowman*	3	....	19 12	31	17 10	27
Gayley	36	VIII. ENGLISH LITERATURE; from Chaucer to Davenant. Recitations; lectures specially upon the Elizabethan dramatists, exclusive of Shakespeare	3	....	32 23	55	31 15	46
		[Course IX. not offered in 1889–90.]						

Record of Courses of Instruction—Continued.

Instructor.	Number	Title and Description of Course.	No. of Hours a Week.		No. of Students in Attendance		No. of Students Passed at Final Examination	
			1st Term	2d Term				
Gayley	37	X. English Literature; The Shakesperean drama. Plays selected: *A Midsummer Night's Dream*, *The Merchant of Venice*, *As You Like It*, *Twelfth Night*, *The Tempest*, *Much Ado About Nothing*, *The Comedy of Errors*, *Richard II.*, *Henry IV.*, Part I., *Richard III.*, *Hamlet*, *Macbeth*, *Othello*, *King Lear*, and *Coriolanus*. These plays are studied in *Seminary*, by theses and discussion on the part of the class. From each student two theses are required, which shall be regarded as a substitute for the themes of the term	3	----	19 11	30	19 9	28
Gayley Bradley	38	XI. English Literature; from Davenant to Wordsworth. Recitations; lectures specially upon the writers of the Augustan period	---	3	35 19	54	34 18	52
Gayley	39	XII. English Literature; Poets of the Nineteenth Century. *Seminary* and Lectures	3	----	9 7	16	8 5	13
Gayley	40	XIII. English Literature; Masterpieces of prose and verse: Malory's *Morte Darthur;* More's *Utopia;* Milton's *Areopagitica;* Burke's *Reflections on the French Revolution;* Carlyle's *Sartor Resartus;* George Eliot's *Mill on the Floss;* Thackeray's *Henry Esmond.* Spenser's *Faery Queen*, Book I.; Shakespeare's sonnets; Milton's *Paradise Lost;* Dryden's *Absalom and Achitophel;* Pope's *Rape of the Lock;* Wordsworth's shorter poems; Tennyson's *In Memoriam;* Browning's *Blot in the 'Scutcheon. Seminary*	----	3	11 4	15	10 4	14
Gayley	41	XIV. The Æsthetics of Literature. Lectures	----	2	13 4	17	13 3	16
Gayley	42	XV. The Principles of Literary Criticism. *Seminary.* The discussion of the technique and function of Tragedy, Comedy, the Epic, the Lyric, the Novel, and other literary types	----	3	10 11	21	10 10	20
		[Course XVI. not offered in 1889–90.]						
Bradley	43	XVII. Comparative Literature; The Novel. *Seminary.* A study of the origin and development of the novel; critical reading of selected works of the great novelists	----	2	4 3	7	4 2	6
	44	*XVIII. Themes. *Freshman year:* Four themes each term required of all candidates for a Bachelor's degree.	1½	----	63 5	68	31 3	34
Armes	----	Section 1	--	1½	53 4	57	25 4	29
Hubbard	----	Section 2	1½	----	41 24	65	28 17	45
			--	1½	40 21	61	28 16	44
Bradley	----	*Sophomore year:* Four themes each term required of all candidates for the degree of Bachelor of Arts, Bachelor of Letters, or Bachelor of Philosophy; three themes each term required of all candidates for the degree of Bachelor of Science	1½	----	69 19	88	35 13	48
			--	1½	66 12	78	31 10	41

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* Beginning with 1889–90, themes are to be given a value, in recitation hours, of one and one half hours a week.

RECORD OF COURSES OF INSTRUCTION—Continued.

INSTRUCTOR.	Number	TITLE AND DESCRIPTION OF COURSE.	No. of Hours a Week.		No. of Students in Attendance		No. of Students Passed at Final Examination	
			1st Term	2d Term				
Bradley	----	**Junior year:* Two themes each term required of all candidates for a Bachelor's degree	1½	---	49 6	55	37 4	41
			--	1½	52 5	57	25 4	29
Gayley	----	*Senior year:* Two themes each term required of all candidates for the degree of Bachelor of Arts, Bachelor of Letters, or Bachelor of Philosophy	1½	----	10 5	15	10 5	15
			--	1½	9 2	11	9 2	11
		GERMAN.						
	45	I. INTRODUCTORY COURSE. *First year:* The Joynes-Meissner *German Grammar*, with references to other German Grammars; Buchheim's *Modern German Reader*, Vols. I. and II.						
Putzker	-- -	Section 1	4	----	25 11	36	17 6	23
			-	4	21 7	28	17 6	23
Senger	----	Section 2	4	----	27 7	34	23 5	28
			--	4	24 5	29	22 4	26
Putzker	----	*Second year:* SCHILLER. *Maria Stuart, Wilhelm Tell, Die Jungfrau von Orleans,* and other writings. Lectures on the topics under consideration; one exercise a week in grammar and syntax	4	---	39 5	44	30 4	34
			--	4	44 5	49	32 5	37
Senger	46	II. MIDDLE HIGH GERMAN. [Omitted.]	----	----	--------		--------	
Senger	47	III. GOETHE. In the class-room, selected masterpieces of Goethe, *e. g., Hermann und Dorothea, Gœtz von Berlichingen, Iphigenie auf Tauris; Egmont;* Gœdeke's *Goethe's Leben;* lectures on the topics under consideration; written exercises. Outside of the class-room, the study of Schiller continued from the second year of Course I.	3	----	14 5	19	9 5	14
			--	3	10 2	12	9 2	11
Putzker	48	IV. LESSING. In the class-room, selected masterpieces of Lessing, *e. g., Emilia Galotti, Minna von Barnhelm, Nathan der Weise;* Gœring's *Lessing's Leben;* lectures on the topics under consideration; written exercises. Outside of the class-room, the study of Goethe's works continued from Course III.; special work assigned in some cases	3	----	8 4	12	8 2	10
			--	3	8 3	11	8 2	10
Senger	49	V. COMPOSITION AND CONVERSATION. Topics from History and German Literature	2	----	3 1	4	1 0	1
			--	2	4 1	5	1 0	1
Putzker		VI. GERMAN LITERATURE. Graduate Course	1	1	--------		--------	
		FRENCH.						
Paget	51	I. INTRODUCTORY COURSE. *First Year:* Keetels' *Elementary French Grammar; Athalie.* A part of *Le Roi des Montagnes* read in the class; the remainder read outside the class, for examination	4	----	48 14	62	27 12	39
			--	4	45 12	57	37 10	47

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*The theses presented in Seminary Courses X., XII., XIII., XV., and XVII. were accepted in place of these requirements.

RECORD OF COURSES OF INSTRUCTION—Continued.

INSTRUCTOR.	Number	TITLE AND DESCRIPTION OF COURSE.	No. of Hours a Week.		No. of Students in Attendance		No. of Students Passed at Final Examination	
			1st Term	2d Term				
Paget	----	*Second Year:* Keetels' *Elementary French Grammar; Polyeucte* (Corneille); *Hernani* and *Ruy Blas* (V. Hugo); *Grandeur et Décadence des Romains* (Montesquieu); *Le Misanthrope* (Molière). *L'Abbé Constantin* and *L'Ami Fritz* read outside of the class for examination. Further like work was assigned as occasion required	3	----	20 12	32	14 8	22
			--	3	21 10	31	17 8	25
Paget	52	II. ADVANCED COURSE. *First Year: Grammaire française* (*cours supérieur*), by A. Chassang, as a book for reference. The lectures on the French language continued, and a study of French literature, with readings from the principal French writers, begun. Selections from Chanson de Rolland (eleventh century), Joinville (thirteenth century), Montaigne (sixteenth century), selections in prose from Pascal, Bossuet, Fénelon, La Bruyère, Descartes, and selections in poetry from Corneille, Boileau, Racine, Molière, La Fontaine (seventeenth century), and selections from Massillon, Voltaire, Buffon, Montesquieu (eighteenth century)	3	----	11 7	18	11 6	17
			--	3	12 9	21	8 8	16
Paget	----	*Second Year:* The course of French literature continued with special study of the literature of the nineteenth century, and lectures in French on the same once a week during the second term	2	----	3 1	4	3 1	4
			--	2	4 1	5	4 1	5
		SPANISH.						
Paget	53	I. INTRODUCTORY COURSE. Monsanto and Languellier's *Practical Course with the Spanish Language.* Reading matter assigned as occasion requires	3	3	17 4	21	2 1	3
		MATHEMATICS.						
	54	I. SOLID AND SPHERICAL GEOMETRY, ALGEBRA, TRIGONOMETRY, ANALYTIC GEOMETRY. (1) Solid and Spherical Geometry. Venable's *Elements of Geometry.*						
Edwards	----	Section 1	4	----	16 9	25	13 6	19
Edwards	----	Section 2	4	----	19 5	24	15 4	19
Veneziani	----	Section 3	4	----	14 6	20	11 4	15
		(2) Algebra. Hall and Knight's *Higher Algebra.*						
Veneziani	----	Section 1	4	----	18 1	19	12 0	12
Stringham	----	Section 2	----	4	47 17	64	15 13	28
		(3) Plane and Spherical Trigonometry, and Analytic Geometry. Clarke's *Manual of Trigonometry;* C. Smith's *Conic Sections.*						
Edwards	----	Section 1 (Sophomores)	3	----	25 8	33	11 1	12
Edwards	----	Section 3 (Freshmen)	----	4	19 3	22	13 1	14
Stringham	----	Section 2 (Sophomores)	4	----	28 10	38	14 8	22

RECORD OF COURSES OF INSTRUCTION—Continued.

INSTRUCTOR.	Number.	TITLE AND DESCRIPTION OF COURSE.	No. of Hours a Week.		No. of Students in Attendance.	No. of Students Passed at Final Examination.
			1st Term.	2d Term.		
	55	II. GEOMETRY, ALGEBRA, TRIGONOMETRY, PROLEGOMENA TO THE CALCULUS.				
Veneziani	----	(1) *Solid and Spherical Geometry* (*B*). The fundamental propositions of the Euclidean geometry of space	3	----	27 0 27	19 0 19
		(2) *Algebra* (*A and B*). The later chapters in elementary algebra, the general theory of equations, elements of the theory of determinants. Todhunter's *Theory of Equations.*				
Clarke	----	Section A	5	----	16 1 17	10 1 11
Clarke	----	Section B	3	----	24 0 24	14 0 14
		(3) *Trigonometry and Hyperbolic Functions.* The development of the general formulæ of plane and spherical trigonometry; solution of plane and spherical triangles; practice in the use of logarithmic tables; algebraic trigonometry, and hyperbolic functions. Clarke's *Manual of Trigonometry.*				
Edwards	----	Section A	3	----	17 0 17	16 0 16
Clarke and Edwards	----	Section B	----	3	22 0 22	16 0 16
Edwards	----	(5) *Analytic Geometry* (*A and B*). The analytic geometry of the straight line, the circle, and the conic sections, including a discussion of the general equation of the second degree and some special examples of transcendental and higher plane curves	----	4	31 0 31	16 0 16
Stringham	----	(6) *Prolegomena to the Differential and Integral Calculus* (*A*). A discussion of first principles and the development of the earlier fundamental formulæ of the differential and integral calculus	----	3	17 1 18	9 1 10
Edwards	56	III. ANALYTIC GEOMETRY. Supplementary to Course I. (3). The straight line, the circle, and the conic sections; discussion of the general equation of the second degree; examples of transcendental and higher plane curves; introduction to the analytic geometry of space. Wood's *Elements of Coördinate Geometry*	----	2	7 3 10	3 0 3
Stringham	57	IV. DETERMINANTS. The general theory of determinants and their more important applications to geometry and analysis	2	----	2 1 3	1 1 2
----------	58	V. PROJECTIVE GEOMETRY. [Omitted.]	----	----	--------	--------
Clarke and Stringham	59	VI. ANALYTIC GEOMETRY OF SPACE. The elementary analytic geometry of the straight line in space, the plane, the sphere, and the conicoids, and a discussion of the theory of higher curves and surfaces, including the determination of curvatures by the methods of the differential calculus. Smith's *Solid Geometry*	----	4	16 2 18	12 2 14

Record of Courses of Instruction—Continued.

Instructor.	Number.	Title and Description of Course.	No. of Hours a Week.		No. of Students in Attendance		No. of Students Passed at Final Examination	
			1st Term	2d Term				
Stringham	60	VII. Differential and Integral Calculus. Development of the later fundmental formulæ of the differential and integral calculus. Applications to various problems in geometry and analysis, such as indeterminate forms, maxima and minima values, expansion of functions, lengths of curves, areas of surfaces, volumes of solids, centers of gravity, curve tracing, etc. Rice and Johnson's *Differential Calculus, abridged edition;* Johnson's *Integral Calculus*	4	----	18 1	19	11 1	12
Stringham	61	VIII. Differential and Integral Calculus. Advanced course; a continuation of Course VII. Rice and Johnson's *Differential Calculus* and Byerly's *Integral Calculus*	2	2	8 0	8	6 0	6
Stringham	62	IX. Conic Sections. Advanced course; involving modern algebraical methods. Salmon's *Conic Sections*	2	2	1 1	2	0 1	1
--------	63	X. Higher Plane Curves. [Omitted.]	----	----	----	----	----	----
Stringham	64	XI. Differential Equations. Theory and methods of solution of total differential equations. Forsyth's *Differential Equations.*	2	2	3 0	3	1 0	1
Stringham	65	XII. Method of Least Squares. The fundamental principles and processes of the method of least squares, and their application to the problems involved in the reduction of astronomical and physical observations. Chapter on *Least Squares* in Doolittle's *Astronomy*	2	----	11 0	11	10 0	10
Edwards	66	XIII. Quaternions. An elementary presentation of the principles of the subject, with illustrations of its applications to geometry and mechanics. Hardy's *Elements of Quaternions*	----	3	2 0	2	----	----
Edwards	67	XIV. Differential and Integral Calculus. An elementary course, designed for students in Non-Scientific courses, who may wish to continue their mathematical studies after the Sophomore year, and also for students in the Scientific courses who are not required to pursue the full course in mathematics, but who desire some acquaintance with the calculus and its most important application	2	2	5 0	5	5 0	5
Stringham	68	XV. Seminary Course for Graduates. Discussion of special topics in higher mathematics, with special reference to their applications in physics and astronomy	2	2	4 0	4	1 0	1
		PHYSICS.						
Slate	69	I. General Physics. Lectures, with experimental illustrations, on mechanics, heat, light, magnetism, electricity and sound.	4	----	28 9	37	20 4	24
		Section 1 (Juniors)	--	4	15 1	16	10 1	11
		Section 2 (Sophomores)	4	4	18 2	20	17 2	19

Record of Courses of Instruction—Continued.

Instructor.	Number	Title and Description of Course.	No. of Hours a Week. 1st Term	No. of Hours a Week. 2d Term	No. of Students in Attendance		No. of Students Passed at Final Examination	
Raymond Drew	70	II. Physical Laboratory. Exercises connected with the subject of chemical philosophy, as pursued by students of agriculture and chemistry, such as: Vapor-density determinations by the methods of Meyer, Dumas, Hofman; determinations of boiling point, specific heat, heat developed in chemical reactions, specific gravity; galvanic measurements connected with electrolysis	----	3	2 0	2	2 0	2
Raymond Drew	71	III. Physical Laboratory: Problems. Selected physical problems, involving mathematical and experimental work, such as: Experimental determination of the moment of inertia, and of the focal length and the curvature of lenses; measurements of galvanic resistance, and of electro-motive force and intensity; determination of the modulus of elasticity, and of the coefficient of expansion by heat	----	3	21 0	21	18 0	18
Raymond Drew	72	IV. Physical Laboratory: Problems. A continuation of the preceding course, consisting of more advanced problems, involving accurate measurement, and more extended knowledge. The scope of this work is varied and enlarged according to the capacity of the student and the time at his disposal	9	9	13 0	13	8 0	8
Slate	73	V. Electrical Measurements. Based on Ayrton's *Practical Electricity*	4	----	4 0	4	3 0	3
		ASTRONOMY.						
Soulé	74	I. General Astronomy. General facts and principles underlying the science of astronomy, physical and spherical, with solutions of many problems, particularly those relating to the determination of latitude, longitude, time, etc. Young's *General Astronomy*	3	----	9 3	12	6 1	7
Soulé	75	II. Practical Astronomy and Navigation. A continuation and completion of the preceding course. Astronomy: Doolittle's *Astronomy*. Geodesy: Clarke's *Geodesy*. Navigation and Nautical Astronomy: Different methods of determining a ship's place and laying its course, including Sumner's method. Practical work in the observatory with sextant, clock, chronograph, transit-and-zenith telescope	4	7	5 0	5	5 0	5
		CHEMISTRY.						
	76	I. Elementary Chemistry. Recitations and lectures, fully illustrated by experiments. Eliot and Storer's *Elementary Manual*, and Roscoe's *Elementary Chemistry* (Inorganic part).						
Rising	----	Section 1	----	3	20 5	25	17 4	21
O'Neill	----	Section 2	----	4	36 3	39	28 2	30

RECORD OF COURSES OF INSTRUCTION—Continued.

INSTRUCTOR.	Number	TITLE AND DESCRIPTION OF COURSE.	No. of Hours a Week. 1st Term	No. of Hours a Week. 2d Term	No. of Students in Attendance		No. of Students Passed at Final Examination	
Rising	77	II. EXPERIMENTAL LECTURES ON INORGANIC CHEMISTRY. Roscoe and Schorlemmer's *Manual of Chemistry*, read in connection with the lectures	----	2	----	----	----	----
Rising	78	III. CHEMICAL PHILOSOPHY. *First term:* Recitations in Cooke's text-book on the the subject, supplemented by notes and explanations. *Second term:* Short courses of lectures on thermo-chemistry, electrolysis and spectrum analysis	2	2	5 0	5	3 0	3
Rising	79	IV. LECTURES ON ORGANIC CHEMISTRY. Richter's *Organische Chemie* used as a work of reference	2	2	5 0	5	5 0	5
O'Neill	80	V. LABORATORY: QUALITATIVE ANALYSIS. General principles of qualitative analysis, characteristic reactions and tests for bases and acids; analysis of simple and complex salts and mixtures; examination of substances in common use, or of domestic importance, for impurities or adulterations. Special attention will also be given to the general relations of the elements, and to synthetic preparations	12 --	---- 8	30 1 31 1	31 32	25 1 20 1	26 21
Rising	81	VI. LABORATORY: QUANTITATIVE ANALYSIS. Gravimetric and volumetric analysis of ores, minerals, etc.; practice in the preparation of organic and inorganic compounds; organic analysis; special investigations; methods of analysis	----	----	----	----	----	----
---	82	VII. PHYSIOLOGICAL CHEMISTRY. [Omitted.]	----	----	----	----	----	----
O'Neill	83	VIII. BLOWPIPE ANALYSIS: QUALITATIVE. Cornwall's or Landauer's *Blowpipe Analysis.* Laboratory practice	----	4	26 1	27	19 1	20
Rising	84	IX. BLOWPIPE ANALYSIS: QUANTITATIVE	----	----	----	----	----	----
---	85	X. MODERN THEORIES IN CHEMISTRY. [Omitted.]	----	----	----	----	----	----
		BOTANY.						
Greene	86	I. VEGETAL STRUCTURE AND MORPHOLOGY. Lectures, illustrated as fully as possible by living specimens, and recitations from Bastin's *Elements of Botany*	3	----	19 9	28	12 8	20
Greene	87	II. SYSTEMATIC AND ECONOMIC BOTANY. Practical exercises in the determination of genera and species of the California flora; lectures on plants of commercial value, and on those useful or injurious to agriculture in California. *Botany of State Geological Survey* and Gray's *Synoptical Flora of North America*	----	3	16 9	25	13 8	21
Greene	88	III. ADVANCED SYSTEMATIC BOTANY. Special studies in the different phanerogamic natural orders, involving the determination and classification of specimens	3	3	2 1	3	1 1	2

Record of Courses of Instruction—Continued.

Instructor.	Number	Title and Description of Course.	No. of Hours a Week. 1st Term	No. of Hours a Week. 2d Term	No. of Students in Attendance		No. of Students Passed at Final Examination	
		ZOÖLOGY.						
Jos. LeConte	89	I. Comparative Zoölogy. Lectures. The course is essentially one of comparative physiology. *First term:* Organs and functions of animal life, *i. e.*, nervous systems, sense organs, muscular and skeleton systems. *Second term:* Organs and functions of vegetative life, *i. e.*, digestive, circulatory, respiratory and excretory systems	2	----	42 8	50	37 7	44
			--	2	37 3	40	32 2	34
Jos. LeConte	90	II. Biological Laboratory. In connection with the work in comparative zoölogy and in continuation of this work, students who desire to pursue the subject by laboratory work in biology are encouraged to do so, the necessary microscopes and work-room being furnished to them. The work is under the general supervision of the professor in charge of the course in Comparative Zoölogy. The books recommended are Huxley and Martin's *Practical Biology*, and Rolleston's *Forms of Animal Life*	----	----	2 0	2	1 0	1
		GEOLOGY.						
Jos. LeConte	91	I. Geology. *First term:* Dynamical and structural geology. *Second term:* Historical geology	3	----	37 12	49	34 10	44
			--	3	44 11	55	41 10	51
Jackson	92	II. Petrography. General and microscopic petrography, embracing (1) the different methods of rock investigation, macroscopic, microscopic, physical, and chemical; (2) rock-texture and rock-structure; (3) the different forms in which rock-masses occur; (4) classification and nomenclature; (5) descriptive petrography; (6) petrogenesis, or the origin of rocks; (7) decomposition and other changes which rocks undergo. The course is illustrated by hand specimens and by thin sections projected on a screen by an electric lantern-microscope. Towards the close of the course a few hours are spent in *macroscopic* laboratory determination of unlabeled rocks	2	----	4 0	4	1 0	1
-------------	93	III. Petrographical Laboratory. [Omitted.]	----	----	--------		--------	
-------------	94	IV. Economic Geology. [Omitted.]	----	---	--------		--------	

RECORD OF COURSES OF INSTRUCTION—Continued.

INSTRUCTOR.	Number	TITLE AND DESCRIPTION OF COURSE.	No. of Hours a Week.		No. of Students in Attendance	No. of Students Passed at Final Examination
			1st Term	2d Term		
		MINERALOGY.				
Jackson	95	I. CRYSTALLOGRAPHY, MINERALOGICAL TERMINOLOGY AND DESCRIPTIVE MINERALOGY. The *crystallography* is treated with a view of enabling the student to determine natural crystals at sight, or at most with the use of the contact-goniometer. No time is spent upon mathematical crystallography; all of the work is concentrated upon descriptive crystallography. The course is illustrated by models of crystals. The *mineralogical terminology* deals with all of the physical properties of minerals that are used in determinative work, such as lustre, color, streak, optical reactions in polarized light, cleavage, fracture, hardness, etc., the student carefully examining typical specimens illustrating each property. The *descriptive mineralogy* treats in detail of the crystallographic, physical, chemical, and geological properties of all geologically or economically important minerals, the student having the opportunity, immediately after each lecture, to make a careful examination of specimens illustrating every form in which each mineral occurs	2	2	14 0 14	*
Jackson	96	II. MINERALOGICAL LABORATORY. Determination of unlabeled minerals by means of their physical properties only, the apparatus consisting of penknife, pocket lens, streak-plate and magnet. The object is to give the student sufficient familiarity with the most commonly occurring minerals of geological and economic importance to enable him to recognize or determine them in the field without delay	4	4	6 0 6	†5 0 5
----	97	III. THEORETICAL CRYSTALLOGRAPHY AND CRYSTALLOPHYSICS. [Omitted.]	----	----	----	----
		MECHANICAL ENGINEERING.				
Slate and W. J. Raymond	98	I. ANALYTIC MECHANICS. (*a*) The mathematical treatment of the important principles of dynamics and statics, fully illustrated by problems and applications	4	4	21 0 21	12 0 12
		(*b*) Course supplementary to the preceding	2	2	10 0 10	7 0 7
Hesse	99	II. HYDRODYNAMICS. Investigations in the action of forces upon liquid bodies, either in producing equilibrium (hydrostatics) or motion (hydrodynamics), such as pressure, stability, flow through orifices, pipes, etc., under the influence of gravity, inertia, outer and inner friction	4	----	6 0 6	4 0 4
Hesse	100	III. HYDRAULICS, HYDRAULIC MOTORS, PUMPS, WATER ENGINES. And, in general, such machines and apparatus as operate through the agency of fluids, either in modifying motion or transmitting power	----	2	6 0 6	5 0 5

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* Examination held in connection with that for Course II. of the succeeding year.

† Examination covered Course I. of the preceding year.

Record of Courses of Instruction—Continued.

Instructor.	Number	Title and Description of Course.	No. of Hours a Week. 1st Term	No. of Hours a Week. 2d Term	No. of Students in Attendance		No. of Students Passed at Final Examination	
Rixford	101	IV. Kinematics. *Theoretical:* Treatment of motion without reference to the cause which produces it, comprehending the study of pure mechanism, or the mutual dependence of the movements in the parts of a machine. *Applied:* Application of the preceding to the various kinematic problems connected with machine construction, such as link-motion, transmission by rolling and sliding contact, teeth of wheels, cams, etc.	2	2	4 0	4	4 0	4
Hesse	102	V. Thermodynamics. Mechanical theory of heat, and its application to the theory and construction of motors; of steam, gas, and hot-air engines; of ice-machines; and of air-compressors for transmission of power	2	2	5 0	5	5 0	5
Hesse	103	VI. General Machine Construction	----	4	4 0	4	4 0	4
Hesse	104	VII. Laboratory, Construction and Experimenting	6	6	4 0	4	4 0	4
		CIVIL ENGINEERING.						
W. G. Raymond	105	I. Surveying. The theory of surveying. The instruction includes the theoretical discussion of the following points: 1. The construction, adjustment and use of all modern instruments used by surveyors in field and office work; 2. The field methods of making land, topographic, hydrographic, mine, city and geodetic surveys; 3. The office work involved in the making of maps and computations. Johnson's *Theory and Practice of Surveying* is used as a text-book, and is supplemented by lectures	4	----	15 0	15	14 0	14
W. G. Raymond	106	II. Roads, Railroads and Canals. Recitations and lectures on the location and construction of roads, railroads and canals. Computation of earthwork and masonry by both analytic and graphic methods	----	4	15 0	15	12 0	12
W. G. Raymond	107	III. Field Practice and Mapping. Adjustment of instruments. Practice in plane and topographical surveying. Preliminary and location surveys for a line of railroad, together with the staking-out of the work, the making of estimates, etc. Finished maps of all surveys are required	9	9	14 0	14	12 0	12
Soulé	108	IV. Sanitary Engineering. Recitations and lectures on the ventilation of buildings, the practical construction of works for water-supply and sewerage of cities, and for drainage of agricultural lands. Fanning's *Water-Supply;* Adams' *Sewers*	----	4	6 0	6	6 0	6

RECORD OF COURSES OF INSTRUCTION—Continued.

INSTRUCTOR.	Number.	TITLE AND DESCRIPTION OF COURSE.	No. of Hours a Week.		No. of Students in Attendance.	No. of Students Passed at Final Examination.
			1st Term.	2d Term.		
Soulé	109	V. STRENGTH OF MATERIALS. Character and properties of building materials, such as iron, steel, other metals, timber, natural and artificial stones; practice in the selection of good specimens and the detection of poor ones. Discussions of the elastic and ultimate resistances of these materials; deduction of formulæ for safe and for rupturing loads of beams, etc.; designs of beams of uniform strength; discussion, by both analytical and graphical methods, of torsive stresses, plane of maximum shear, and internal strains. Lectures and numerous problems. Burr's *Elasticity and Strength of Materials of Construction*	4	----	11 0 11	9 0 9
Soulé	110	VI. ENGINEERING STRUCTURES. Theory of joints, and of framing in wood and iron; boiler-plate joints. Theory and construction of solid and open-built girders, of roof trusses, bridge trusses, and railway bridges generally. Theory of suspension bridges, and of foundations on land and under water. Lectures and problems. Wood's *Bridges and Roofs;* Du Bois' *Strains on Framed Structures;* Burr's *Bridges*	----	4	6 0 6	6 0 6
------------	111	VII. ENGINEERING SPECIFICATIONS AND CONTRACTS. [Omitted.]	----	----	--------	--------
		MINING, METALLURGY AND ASSAYING.				
Christy	112	I. MINING. Lectures. Relation of mining to other arts. Nature and occurrence of ores. Mining laws of the United States and Mexico. Location of claims. Prospecting; artesian and diamond-drill boring. Excavation; explosives and blasting. Tunneling: Systems of excavation and timbering. Shaft sinking: Systems of excavation and timbering; special methods for wet ground, such as tubbing, walling, and boring. Winning and exploration of deposits. Exploitation: (1) Deep mining, methods of excavating and supporting used for working veins, beds and masses; (2) Open-cut work, quarries, peat and lake deposits, placers and hydraulic mining. Systems of tramming, hoisting, draining, pumping, lighting and ventilating. General organization and administration	3	3	8 0 8	2 0 2

Record of Courses of Instruction—Continued.

Instructor.	Number	Title and Description of Course.	No. of Hours a Week. 1st Term	No. of Hours a Week. 2d Term	No. of Students in Attendance		No. of Students Passed at Final Examination	
Christy	113	II. Metallurgy. Lectures. *General Part:* Relation of metallurgy to mining and other arts. Classification of ores, and methods of their reduction. Ore crushing: Rock-breakers, rolls, stamps, grinding and pulverizing machines. Sampling of ores and products. Fuels, and their relative value as heat producers. Furnace construction and classification. Fluxes and refractory materials. Metallurgical products. *Special Part:* In view of the local importance of the metallurgy of gold, silver, lead and quicksilver, the entire second term is devoted to a detailed study of methods in successful use for the reduction of the ores of these metals. In order to give the other metals the prominence which their importance demands, their treatment is reserved for the graduate courses	3	3	15 0	15	8 0	8
Christy	114	III. Assaying. Lectures and laboratory practice. Cupellation of gold and silver. Scorification assays of gold and silver ores. Crucible method for these ores. Parting gold and silver. Oxidizing and chloridizing, roasting and leaching of gold and silver ores. Humid assays of silver bullion. Fire assays of ores of lead, antimony, tin, nickel, cobalt, copper, iron and fuels. Volumetric and electrolytic methods with copper, nickel, cobalt	6	----	3 0	3	3 0	3
			--	6	7 0	7	7 0	7
Christy	115	IV. Metallurgical Laboratory. Experiments, on a working scale, in the crushing, sampling, concentration, roasting, leaching and amalgamation of gold and silver ores	----	6	4 0	4	2 0	2
		AGRICULTURE, HORTICULTURE AND ENTOMOLOGY.						
Hilgard	116	I. Agricultural Chemistry. *First Term:* Chemistry of plants and of their products. Nutrition of plants from atmospheric sources. Inorganic ingredients of plants, their importance and derivation; ash analysis. Physics of plants; mechanism of nutrition and movement of the juices. Germination and development of plants, and accompanying chemical changes. *Second Term:* Chemistry and physics of soils; their origin, formation, classification. Physical properties; their determination and influence; mechanical analysis. Chemical composition; relation to vegetable nutrition. Chemical analysis; its methods, utility and interpretation. Policy of culture and maintenance of fertility; exhaustion of soils by irrational culture; rotation of crops; green-manuring, sub-soiling, thorough drainage, irrigation; manures, their kinds, preparation, use, and value; the rational system of culture. General summary	3	----	5 0	5	4 0	4
			--	3	4 0	4	4 0	4

RECORD OF COURSES OF INSTRUCTION—Continued.

INSTRUCTOR.	Number	TITLE AND DESCRIPTION OF COURSE.	No. of Hours a Week.		No. of Students in Attendance		No. of Students Passed at Final Examination	
			1st Term	2d Term				
Wickson	117	II. ELEMENTARY AND ECONOMIC ENTOMOLOGY. Demonstrations both from typical collections and from living specimens. Field and orchard studies of both injurious and beneficial insects, and practical demonstration of the application and effects of various insecticides. Special instruction in the use of the microscope in identifying minute insects injurious to plants, and diseases caused by vegetable parasites	1	----	6 3	9	5 3	8
			--	1	3 4	7	2 4	6
Wickson	118	III. AGRICULTURE AND HORTICULTURE. Stock-breeding, dairying, fruit-culture, and methods of farming. Under the last head attention is directed to methods of culture, farm implements and machinery, practice of irrigation and drainage, and general field crops. The instruction in horticulture extends through the year, touching upon particular topics when they are most seasonable. Stock-breeding and dairying occupy the first term; and dairying, methods of farming and staple crops, the second term. Excursions occupying an entire day or half a day	3	----	6 0	6	5 0	5
			--	3	5 0	5	4 0	4
Jaffa	119	IV. VITICULTURE. [Omitted.]	---	----	----	----	----	----
Jaffa Paparelli Colby	120	V. AGRICULTURAL AND VITICULTURAL LABORATORY. This laboratory is devoted primarily to the prosecution of chemical and physical researches in relation to general agriculture; such as the mechanical and chemical examination of soils, waters, agricultural products, natural and commercial fertilizers, etc., and the determination of technical questions relating to agricultural processes or manufactures. The results of this work are reported to the persons interested, and are published, currently in the form of bulletins, ultimately in the form of annual reports. In order to supply the demand for special instruction in the analysis and investigation of agricultural materials and products, desk room in the laboratories for ten advanced and special students has been provided. They are assigned such special work as may best suit their future professional pursuits	12	----	6 0	6	6 0	6
			--	12	6 0	6	4 0	4
		MECHANICAL DRAWING AND MAPPING.						
W. G. Raymond	121	I. ELEMENTS OF INDUSTRIAL DRAWING. Geometrical drawing, brush-work, lettering	---	3	18 0	18	15 0	15
Kower	122	II. INSTRUMENTAL DRAWING AND DESCRIPTIVE GEOMETRY. Drawing of simple patterns, descriptive geometry, perspective, isometric projection, shades and shadows, etc.	3	3	19 0	19	14 0	14
W. G. Raymond	123	III. MAPPING. Maps of land, topographic and mine surveys; computations	6	----	11 0	11	11 0	11
W. G. Raymond	124	IV. STRUCTURAL DRAWING. Drawing of standard railway structures from dimensions given; topographic modeling	--	6	10 0	10	10 0	10

Record of Courses of Instruction—Continued.

Instructor.	Number	Title and Description of Course.	No. of Hours a Week.		No. of Students in Attendance	No. of Students Passed at Final Examination
			1st Term	2d Term		
Kower	125	V. Mechanical Drawing. Drawing of simple machine parts	6	----	13 0 13	10 0 10
			--	6	15 0 15	12 0 12
Kower	126	VI. Graphostatics. Graphical analysis of stresses in engineering structures	----	2	18 0 18	14 0 14
Kower	127	VII. Construction. Including the designing of engineering structures and machines	9	----	10 0 10	10 0 10
			--	9	11 0 11	11 0 11
		MILITARY SCIENCE.				
Harrison	----	I. Tactical Instruction in the Field	2	2	218 0 218	--------
Harrison	---	II. Target Practice	----	----	-------	--------
Harrison	128	III. A Brief Course in Military Science. Including engineering and fortifications, strategy and tactics, ordnance and gunnery, military law, courts and boards, modern improvements in the art of war, and a study of great battles	1	1	24 0 24	24 0 24
		PHYSICAL CULTURE.	2½	----	169 0 169	120 0 120
Magee	---	Exercises in Harmon Gymnasium	--	2½	170 0 170	111 0 111

The percentage of those who appeared at the examinations and passed them is as follows: In 1888–89, $74\frac{1}{10}$ per centum; in 1889–90, $73\frac{3}{10}$ per centum of all those officially enrolled.

A summary of the number of courses given and of the average time devoted to each course is presented in the following table. Where fractional results appear, the numbers give the mean of two terms or two years:

	Number of Hours a Week.	NUMBER OF COURSES.	
		1888–89.	1889–90.
Courses extending through one term	1	3	4
	2	10	12
	3	14	13
	3½	----------	1
	4	17	19
Courses extending through two terms	1	2	3
	1½	----------	1
	2	14	12
	2½	3	2
	3	11	12
	3½	1	1
	3¾	----------	1
	4	9	8
	5½	1	1
Courses extending through three terms. Entire course given each year: first third to Sophomores; second two thirds to Juniors	4	2	2
Courses extending through four terms. Entire course given each year: first half to Freshmen; second half to Sophomores	2½	1	1
	3½	1	1
	4	1	1
Laboratory courses extending through one term	3	3	3
	4	1	1
	6	1	3
	9	----------	----------
	12	1	----------
Laboratory courses extending through two terms	3	----------	1
	3½	----------	1
	4	2	1
	6	4	3
	9	2	3
	10	1	1
	12	----------	3
	15	1	----------
Uncertain	----------	----------	1
Total number of courses given	----------	106	116
Courses offered, but not given for lack of students or other cause	----------	17	12
Total number of courses offered	----------	123	128

THE UNDERGRADUATE COURSES.

There has been no essential change in our scheme of parallel undergraduate courses during the past four years. Such minor changes as take place through the annual rearrangement of elective courses are recorded in the successive issues of the Annual Announcement of Courses and of the University Register, and therefore need not be mentioned here in detail.

LECTURES AND ESSAYS UNDER THE AUSPICES OF SOCIETIES AND DEPARTMENTS.

1. The programmes of the LONGFELLOW MEMORIAL ASSOCIATION have contained the following:

In 1888–89, Readings from Dr. Sevier, and a Talk on Southern History and Society, by George W. Cable; lecture on the Battle of Adrianople, by Mrs. Florence Williams; essay on Robert Elsmere, by T. R. Bacon; lecture and talk on the New York University Settlement and the Project for University Extension, by Morrison I. Swift; essay on the Institution of the Vestal Virgins, by A. A. Howard; essay on Race Limitations, by Adley H. Cummings; essay on India, by J. Sundberg; essay on Robert Browning as a Poet, by John Vance Cheney; Readings from Millet—stereopticon views of Millet's most celebrated paintings—by Fred Yates; essay, A Day with Doña Concepcion—Presidio in San Francisco, 1806, by Miss Agnes Crary.

In 1889–90, a lecture on the Russian Nihilists, by William Jackson Armstrong; recitation of Tennyson's Elaine, by Miss Ida Benfey; essay on Emerson, by Charles J. Woodbury; five Shakespeare recitals—As You Like It, Julius Cæsar, Merchant of Venice, King Lear, and Henry IV., Part I., by Locke Richardson; essay on Tennyson, by John Vance Cheney; essay on Emerson as a Literary Critic, by C. M. Gayley.

2. The POLITICAL SCIENCE CLUB has met fortnightly during the past two years, and papers on the following subjects have been read and discussed: The President and the Tariff; Probable Effect of the Mills Bill, the Senate Bill, and Absolute Free Trade; Economic Aspects of the Chinese Question; Review of Recent Legislation; the Work of the Individual in securing needed Social Reform; Labor Organization; The Samoan Question; Bellamy's *Looking Backward;* The Pan-American Congress; The Brazilian Revolution; Coöperation as a Solution of the Labor Problem; How Can We Tell whether Socialism is Practicable; Causes of the Decline of American Shipping; The Contribution of the Experience of America to Economic Science; The Silver Question; A Political Forecast.

3. The BERKELEY CHORAL SOCIETY has continued its weekly rehearsals in Literary Hall, and has given during the years 1888–89, 1889–90, six choral concerts in Assembly Hall and one in the Congregational Church, at which have been rendered Gade's Psyche, Mendelssohn's Athalie, Gounod's Redemption, Gounod's Mors et Vita, Smart's Bride of Dunkerron, and many short pieces by celebrated composers.

4. The CLASSICAL CLUB was organized in March, 1889, for study and discussion, by the more advanced classical students in the University and by such other friends of the classics as reside in Berkeley and vicinity. Papers and translations have been presented during this first year of its existence, by Professor Howard, Dr. Richardson, Mr. Miller of the Berkeley Gymnasium, and by members of the Senior and Junior classes.

5. The PHILOSOPHICAL UNION was organized June 24, 1889, by students of philosophy called together by Professor Howison for the purpose. Its constitution declares its objects to be: The improvement of the members in the knowledge of philosophy; the increase of its control over their aims and conduct; the formation of a definite bond among them, and the strengthening of their sympathy, particularly in regard to their common pursuit of philosophy; the awakening of interest in philosophy and the dissemination of knowledge of it, among all persons on whom they can exert an influence; and in particular, the maintenance, at the seat of the University, of a central association for philosophical study and discussion. The total number of members for the year—active,

corresponding and honorary—was 211. Twenty-one meetings of the Union were held during the year, and the attendance was so large as to overcrowd the philosophical lecture-room and require the use of the Assembly Hall. At these meetings a series of papers on the *Apology*, *Crito*, *Euthyphro* and *Phaedo* of Plato, contributed for the most part by graduates of the University, were read and discussed. Bulletins containing accounts of the papers and discussions have been published and distributed to the members, and to other persons interested in philosophy.

6. Under the auspices of the MILITARY DEPARTMENT OF THE UNIVERSITY the following lectures have been delivered in the Assembly Hall since September, 1888: Reminiscences of an American Officer's Tour of Service in the Army of the Khedive of Egypt, by Colonel Richard Savage; The Geronimo Campaign, by Lieutenant Gatewood, U. S. A., Aid-de-camp to General Miles; The Battle of the Big Hole, an Indian Campaign, by Captain Charles A. Woodruff, U. S. A. The fact that these officers played conspicuous roles in the events narrated gave particular interest to these lectures.

7. Under the auspices of the ASSOCIATED STUDENTS the following lectures were delivered in the Assembly Hall in January and February, 1889: The South Revisited, by Joseph Le Conte; Next Steps in Social Progress, by Morrison I. Swift; The Making of a Daily Newspaper, by T. J. Vivian.

STUDENTS' ORGANIZATIONS.

In the Dean's Report for 1886–87, 1887–88 (page 48), was given a short account of the organization of the STUDENTS' CONGRESS. The questions discussed at its meetings form one set of indications of the kind of intellectual activity the students voluntarily engage in. Mr. Pait, Secretary of the Durant-Neolean Society, under the auspices of which the Congress is conducted, has handed me, at my request, the following complete list of bills that were presented and acted upon from the organization of the Congress to the close of the academic year 1889–90:

(1) To regulate naturalization; passed. (2) To repeal internal revenue taxes; defeated. (3) To reduce and simplify the laws in relation to the collection of revenue (the Mills bill); passed. (4) To provide for the election of President by the popular instead of an electoral vote; defeated. (5) To strictly enforce the Monroe Doctrine in regard to the Panama Canal, and to authorize an appropriation to increase the navy; passed. (6) To prohibit foreign immigration to the United States; defeated. (7) To establish a National University; defeated. (8) To regulate and improve the Civil Service of the United States; passed. (9) To authorize the President to appoint Commissioners to confer with the Republics of South America, aiming at a confederation with the United States; defeated. (10) To provide for the absorption and control, by the Government, of interstate telegraph and telephone systems; passed. (11) To provide for the transportation of the entire Negro population to Africa; defeated. (12) To limit the silver coinage; passed. (13) To provide for the nationalization of land in the United States; defeated.

The manager of the STUDENTS' COÖPERATIVE ASSOCIATION, Mr. Roscoe Wheeler, has given me the following statements concerning the business of the association during the past two years. In September, 1889, the association was in debt to the amount of $265; this debt has been removed, and there is now a surplus in the treasury of $502 70. The sales to students, chiefly for books—$100 would probably cover all other sales in any one year—have been as follows:

Year.	Sales.	Students at Berkeley.
1888-89	$7,340 85	363
1889-90	7,170 75	401

These amounts do not represent the total cost of text-books to the entire body of students, inasmuch as a considerable number of the books used are ordered independently of the Coöperative Association, through booksellers, or direct from the publishers. Taking this fact into consideration in connection with the above figures, I infer that $20 a year is not far from the average yearly cost of text-books to each student.

The social, religious, musical, and athletic interests of the students are represented by various organizations, such as that of the Associated Students, the Young Men's Christian Association, the Young Women's Christian Association, the Glee Club, the Tennis Club, the Bicycle Club, etc.

Respectfully submitted.

IRVING STRINGHAM,
Dean.

LETTERS AND LANGUAGES.

PHILOSOPHY.

To the President of the University of California:

SIR: In accordance with your call, I submit the following report of the work in my department for the period of two years ending June 30, 1890, and of the more pressing needs of the department.

The work has been conducted in accordance with the scheme of six distinct lecture courses adopted by the Academic Senate in November, 1888, and printed in the Biennial Report of the President of the University for that year. The provisions of the scheme have been carried out completely. I respectfully refer for them to page 50 of the Biennial Report just cited. Under the two "Alternating Courses," so called, provided for in the scheme, the subjects actually presented during the period now referred to have been the following:

COURSE IV. *Year* 1888–89: THE ANCIENT AND THE MODERN DEVELOPMENT OF IDEALISM. Socrates, Plato, Aristotle; Berkeley, Hume, Leibnitz, Kant, Fichte, Schelling, Hegel. *Year* 1889–90: PHILOSOPHY FROM KANT TO HEGEL. The development of Rationalistic Idealism, from its negative and partial to its complete and positive form.

COURSE V. *Year* 1888–89: THE PHILOSOPHY OF RELIGION. Critique of J. S. Mill's *Three Essays on Religion* and of Kant's *Dialectic of Pure*

Reason. Year 1889–90: KANT'S PRACTICAL PHILOSOPHY. Exposition and criticism of the system.

The course projected for graduate students, as Course VI. in the scheme, has also been carried out, as follows:

COURSE VI. *Year* 1888–89: Course omitted by consent of the Academic Council, on account of the Professor's ill health. *Year* 1889–90: Kant's *Critique of Pure Reason*, in Max Müller's translation.

The number of students attending the various courses offered by the department has steadily increased from its inception. The past year, the number enrolled has been more than double that of any preceding year. And the quality, as well as the quantity, of the work done by the classes has shown a corresponding advance.

As to the needs of the department, they are simply those that I have reiterated from Biennial Report to Biennial Report, and I cannot do better than to refer to the particulars designated in those reports for the years 1886 and 1888. As there said, the needs are: Some provision for an increase of the teaching force, and increased library resources. I respectfully repeat my request for the appointment of an assistant or assistants, and for a considerably larger annual allotment of money for the purchase of books.

With regard to the first of these two objects, I would suggest that a most excellent, as well as economical, way would be to authorize the head of the department to employ one or two of its graduates as assistants in its elementary instruction, to do work under his direct advice and inspection. There are now a number of graduates who could serve efficiently in this way. The plan is in use at Yale and at Johns Hopkins, and it can hardly fail to be extended to other institutions of their grade. It would have many advantages, the greatest of which would be the opportunity it would afford for training qualified graduates for professors, and for keeping distinguished graduate students in residence at the University to pursue advanced studies. This it would do by supplying them, in return for their service, with the moderate support sufficient for their maintenance; a support, without which the great majority of our gifted students would find the prolongation of their studies impossible. I would earnestly commend this suggestion to your serious consideration, with the request that you bring it to the attention of the Board of Regents.

Respecting the increase of means for purchasing books, I can say nothing more to the point than what I have already said in the Biennial Reports for 1886 and 1888, and I beg to refer you to the statements made in them.

Respectfully submitted.

G. H. HOWISON,
Mills Professor of Intellectual and Moral Philosophy and Civil Polity.

HISTORY AND POLITICAL SCIENCE.

To the President of the University of California:

SIR: In the absence of Professor Moses, and at his request, I have the honor to submit the following report:

All the courses announced in the last Biennial Report have been given during the past two years. They will be found also in the Dean's report on preceding pages. In addition to those given two years ago, the two following were offered in the year 1888–89:

HISTORY OF THE NINETEENTH CENTURY. A study of the principal social and political movements since the Congress of Vienna. Four times a week during the first term. Assistant Professor Jones.

Elective, Senior and Junior years, in all courses.

EUROPEAN POLITICS. A seminary study of contemporary events and affairs in Europe. One meeting a week in a session of two hours in length. Assistant Professor Jones.

Elective to students that have completed satisfactorily Course V., History of the Nineteenth Century, and to others who may fulfill the conditions to be prescribed by the instructor in charge.

These two courses had to be abandoned, the first because of insufficiency of the instructional force of the department, the second for the same reason, and because of the inadequacy of the library. The first will, however, be to some extent provided for in the future by a rearrangement of the work of the department. The second course, found to be exceedingly interesting and profitable, cannot be attempted again until the teaching force in history is augmented, and until means are provided for supplying the lamentable deficiency of the library in the literature of contemporary historical occurrences.

The needs of the department stated in the last Biennial Report, pages 51–52, remain unsupplied needs.

In addition to these, and so far as this particular department is concerned, I must call special attention to the demand made for graduate instruction in Political Science. As a partial and very insufficient response to this demand, the following course was offered in the second half of the year 1889–90:

POLITICAL SCIENCE. A course of graduate study in the science of politics. Once in two weeks, during the second term, in a session of two hours. Professor Moses.

Open to graduates, and to special students who are qualified to enter upon the work of the course.

I shall likewise attempt to meet in some degree this very active interest in questions of political science, shown by our own graduates and by graduates of eastern universities, by offering a single fortnightly graduate course during the coming year.

One other question of predominant importance to the whole University overshadows the needs of any particular department. This is the question of the enlargement of our library. The resources of the Reese Fund are far too small to supply even our most urgent needs. The method of disbursing the annual income of this fund is so faulty that neither new books nor books that are out of print can be purchased. This defect of method ought to be removed by proper legislation by the Regents; and I beg to suggest a substantial annual appropriation—say, $10,000—should be made from the General Fund for the enlargement of the library. The wants of the students in the matter of books should receive special attention.

Respectfully submitted.

WM. CAREY JONES,
Associate Professor of United States History.

GREEK.

To the President of the University of California:

SIR: During the last year neither the course of studies nor the methods of instruction in Greek have been essentially changed.

I would recommend that certain books of reference be furnished the Department of Greek, to be kept in the lecture-room for the use of students. This small library should include Liddell and Scott's Greek Lexicon, Smith's Dictionaries of Biography, Geography, and Antiquities, the best classical atlases, etc.

This opportunity may be taken to call your attention to the fact that the annual library appropriations for the Department of Greek are only large enough to procure a portion of the latest publications. It is very necessary that a large additional sum should be granted for the purchase of the best editions of the Greek writers and the illustrative works, without which no University library could claim an approach to completeness.

In conclusion, I take the liberty of repeating the recommendation in my last report that the University shall become a contributor to the support of the American School of Classical Studies at Athens. This institution is assisted by all the most prominent colleges and universities of America. The annual payment of the sum of $250 secures the advantages of the school to all the Bachelors of Arts of the University contributing it.

Respectfully submitted.

GEO. WOODBURY BUNNELL,
Professor of the Greek Language and Literature.

LATIN AND PHILOLOGY.

To the President of the University of California:

SIR: My report concerning the Latin Department is necessarily meager, on account of my absence from the State the past two years. During that time my classes were taken by Professor Albert A. Howard. Mr. Deamer's place as instructor in the Sophomore and Freshman classes was taken last year by Dr. George M. Richardson, whose services have been secured for the coming year.

In the Freshman instruction, as heretofore, considerable time has been spent in the drill which should have been given in preparatory schools. If these schools were all of a high grade, the first year of the University course could start at a more advanced point, and secure better results. It is the misfortune of our new State that the preparation for college is so unequal and defective.

The Sophomore work is measurably free from this first disadvantage, and its results are more satisfactory. For many in the College of Letters, this is the last year in which time is allotted to the study of Latin. Much importance, therefore, is attached to the reading of the year, which is of a wide range and variety.

During both years special attention is given to the making of Latin prose, and to exercises in reading at sight.

With entrance on the Junior year, the studies of the course become wholly elective. There is not only a new freedom of choice in the latter half of the course, but to a certain extent a change of method. More time is given to lectures, to discursive readings, and to special investigations.

At no time has this department confined itself to the works enumerated in the printed curriculum. Certain standard text-books are specified, to indicate the type of the work expected. But from year to year there has been much freedom of selection, and a frequent change of text-books.

The number of students pursuing the study of Latin during the past two years, in the several classes, is as follows:

	1888–89.		1889–90.	
	First Term.	Second Term.	First Term.	Second Term.
Freshmen	34	31	40	39
Sophomores	28	27	21	20
Juniors	13	9	8	8
Seniors	6	6	7	5
Roman Archæology		25		15
Roman Literature	2		2	

Lectures have been as heretofore: to the Seniors in Comparative Philology, and to the Sophomores in Roman Archæology. The Seniors have had also the usual course in linguistics, using Professor Whitney's Language and the Study of Language.

As I have but just returned, I cannot speak with exact knowledge of the wants of the department. In general terms, I know that it needs many additions to its editions of Latin authors, to its books of reference, and to its illustrative apparatus.

Respectfully submitted.

MARTIN KELLOGG,
Professor of Latin.

ENGLISH.

To the President of the University of California:

SIR: In compliance with the request contained in a recent circular issued by you, I submit the following statement concerning the work done in the English Department during the year closing June 30, 1890. Since this is my first year of service in the University of California, my report for the year 1888–89 must necessarily be meager.

Touching the condition in which, upon undertaking the duties of the Professorship of English Literature, I found the affairs of the department, it would be a labor of supererogation to say more than that the judgment displayed in the scheme of study laid out and conducted by my predecessor, Professor Cook, and his associates, is of itself sufficiently attested by the importance that has long attached, in the eyes of the University, to the work in the English language and literature.

Since a consideration of the two announcements issued by the English Department during the last year may suggest certain variations from the arrangement and methods hitherto pursued, I have thought it wise, by the combination of these announcements, to bring to your notice a complete scheme of the courses of study as now offered:

I. (*a*) ENGLISH PROSE STYLE. Study of English prose composition on the basis of Minto's Manual of English Prose Literature and Lewes' Principles of Success in Literature. Four times a week throughout the year.

(*b*) THE DEVELOPMENT OF ENGLISH PROSE STYLE. Critical study of the leading English prose writers from 1300 to 1700, on the basis of Minto's Manual of English Prose Literature, Part II. Once a week during the first term.

II. SUMMARIES. Training in reading, note-taking, and rapid reproduction of the matter presented. Once a week during the first term.

III. THE HIGHER RHETORIC. Recitations, and discussions by lectures of Aristotle's Rhetoric and Poetics, Lessing's Laocoön, Spencer's Philosophy of Style, and other standard works upon the subject. Three times a week during the first term.

IV. GOTHIC. Grammar, translation of texts, comparative study of word forms, lectures on the relation between Old English and Gothic. Twice a week during the second term.

V. (*a*) OLD ENGLISH. Reading of simple prose, elements of Old English grammar as an introduction to the historical study of English. Three times a week during the first term.

(*b*) ADVANCED OLD ENGLISH; Beowulf. Critical study of Beowulf, survey of Old English literature, lectures on Old English grammar. Three times a week during the second term.

VI. (*a*) MIDDLE ENGLISH. Critical study of selections from Morris' Specimens of Early English, Part I. Survey of Middle English literature, studies in phonology and syntax, dialectical variations, development of the language from the Old English period. Three times a week during the second term.

(*b*) HISTORY OF THE ENGLISH LANGUAGE. Recitations and lectures. Twice a week during the first term.

VII. ENGLISH LITERATURE; Chaucer and his contemporaries. Critical study of selected works. Three times a week during the first term.

VIII. ENGLISH LITERATURE; From Chaucer to Davenant. Recitations, lectures specially upon the Elizabethan dramatists, exclusive of Shakespeare. Three times a week during the first term.

IX. ENGLISH LITERATURE; The Origin and Development of the English Drama. Lectures twice a week during the first term.

X. ENGLISH LITERATURE; The Shakespearean drama. Plays selected: A Midsummer Night's Dream, The Merchant of Venice, As You Like It, Twelfth Night, The Tempest, Much Ado About Nothing, The Comedy of Errors, Richard II., Henry IV., Part I., Richard III., Hamlet, Macbeth, Othello, King Lear and Coriolanus. These plays are studied in *Seminary*, by theses and discussion on the part of the class. From each student two theses are required, which shall be regarded as a substitute for the themes of the term. Three times a week during the first term.

XI. ENGLISH LITERATURE; From Davenant to Wordsworth. Recitations, lectures specially upon the writers of the Augustan period. Three times a week during the second term.

XII. ENGLISH LITERATURE; Poets of the Nineteenth Century. Wordsworth, Tennyson and Browning. *Seminary* and lectures. Three times a week during the first term.

XIII. ENGLISH LITERATURE; Masterpieces of Prose and Verse: Malory's Morte Darthur, More's Utopia, Milton's Areopagitica, Burke's Reflections on the French Revolution, Carlyle's Sartor Resartus, George Eliot's Mill on the Floss, Thackeray's Henry Esmond; Spenser's Faery Queen, Book I., Shakespeare's Sonnets, Milton's Paradise Lost, Dryden's Absalom and Achitophel, Pope's Rape of the Lock, Wordsworth's Shorter Poems, Tennyson's In Memoriam, Browning's Blot in the 'Scutcheon. *Seminary*. Three times a week during the second term.

XIV. THE ÆSTHETICS OF LITERATURE. Lectures. Twice a week during the second term.

XV. PROBLEMS IN LITERARY CRITICISM. *Seminary*. The discussion of the technique and function of Tragedy, Comedy, the Epic, the Lyric, the Novel, and other literary types. Three times a week during the second term.

XVI. COMPARATIVE LITERATURE; The Novel. *Seminary*. A study of the origin and development of the novel, critical reading of selected works of the great novelists. Twice a week during the second term.

XVII. COMPARATIVE LITERATURE; The Choral Hymn, the Epic, the Lyric, and the Drama. Lectures. Twice a week during the first term.

XVIII. THEMES. *Freshman year:* Four themes each term are required of all candidates for a Bachelor's degree.

Sophomore year: Four themes each term are required of all candidates for the degree of Bachelor of Arts, Bachelor of Letters, or Bachelor of Philosophy; three themes each term are required of all candidates for the degree of Bachelor of Science.

Junior Year: Two themes each term are required of all candidates for a Bachelor's degree.

Senior Year: Two themes each term are required of all candidates for the degree of Bachelor of Arts, Bachelor of Letters, or Bachelor of Philosophy.

It will be noted that three distinct lines of study are pursued: The rhetorical (Courses I.–III., inclusive, and XVIII.), the philological or linguistic (Courses IV.–VI.), the literary and critical (Courses VII.–XVII.). While as much attention as hitherto is bestowed upon the philological side of English work, it is probable that more stress than formerly is laid upon the study of literature from the point of view of its evolution comparatively and scientifically considered, and from the point of view of Æsthetics.

Of the more special methods encouraged by the department, that denominated in German universities the *Seminar*—or conference—is most noteworthy. It is a combination of the lecture system, the essay system, and the recitation system. It is especially adapted to the needs of advanced students. While the *Seminary*, or conference, by the informal discussion of assigned topics, brings instructor and student into relations more intimate than those resulting from any one of the older systems of instruction, it also secures reading wider and perhaps more intelligent on the part of the student, and a more willing preparation of such theses as may be required for the conduct of the class.

The most pressing wants of the department, more imperatively pressing in proportion as the number of students availing themselves of its advantages continues to increase, are the following:

1. An appropriation of at least $1,000 for the purchase of standard editions of works in English literature not possessed by the University Library. In Chaucerian authorities, in Elizabethan literature, in the masterpieces of the eighteenth and nineteenth centuries the library is painfully deficient. All genuinely independent research on the part of students is handicapped by this deficiency.

2. An appropriation of at least $1,000 for the purchase of standard works requisite for the comparative study of literature. Some such appropriation is absolutely and immediately necessary to the success in original work both of advanced students and of the Faculty of the department.

3. The appointment from year to year, at a salary of from $1,200 to $1,500, of an Instructor in English Writing and Speaking, who, first, by relieving the present instructors to some extent of their heavy task of essay correction, may enable them to give more time to the teaching of the English philology, higher rhetoric, and literature, and, second, by instituting classes in practical elocution and forensics, may enable our students to utter themselves with some force and propriety on public occasions, or, at any rate, to read so that they may be understood.

I would also respectfully and earnestly urge upon the consideration of the Board of Regents the following suggestion: That if it may not seem feasible to assign to the department an Instructor in English Writing and Speaking, two scholars or Fellows be appointed for one year, at a salary of $500 apiece, who, while pursuing in the University studies prescribed for the higher degrees, shall devote a certain number of hours a week to the giving of such instruction as has been above recommended. These scholars or Fellows should be recent graduates of the University, of high scholarship, and of special ability in the lines of work in which they shall be required to impart instruction.

Respectfully submitted.

CHARLES M. GAYLEY,
Professor of the English Language and Literature.

GERMAN.

To the President of the University of California:

SIR: Permit me to submit a memorandum regarding the Department of the German Language and Literature.

The attendance during the last two years has been very satisfactory, and the work of the students has shown a spirit of faithfulness and earnestness, some having performed work not imposed upon them. Dr. Senger, to meet the needs of the department, has given an additional course of two hours a week to students with whom German is vernacular and whom, otherwise, it would have been difficult to classify. I have added one hour a week to the advanced undergraduate work and one hour a week was given by me to a small number of somewhat advanced students.

The needs at present are the same as when the last report was written, and in addition I should like to have a competent person appointed to take off my hands the examining of written papers required every week. This work is most useful and necessary, but consumes too much of my time, and it would be economy to relieve me of the same. In view of the benefits arising from the carrying into effect of this last recommendation, the expense involved would seem insignificant.

Respectfully submitted.

ALBIN PUTZKER,
Professor of the German Language and Literature.

FRENCH AND SPANISH.

To the President of the University of California:

SIR: In accordance with your request, I would report as follows in regard to the Department of French and Spanish:

Two years ago I called attention to the extraordinary increase of the French classes. This increase has at least been held, and now the Junior and Senior classes are large also. There are certain requirements produced by this increase, which I should be glad to have recognized. But I desire even more that whatever contribution has been made by this department to the intellectual life of the University should receive recognition at the hands of the governing Board.

Respectfully submitted.

F. V. PAGET,
Assistant Professor of French and Spanish.

GENERAL SCIENCE.

MATHEMATICS.

To the President of the University of California:

SIR: In response to your request for a report on the work of the Mathematical Department during the past two years, and on its present needs, I beg leave to submit the following:

During the past two years the department has been severely handicapped by the continued illness of one of the Associate Professors, at a time when the classes were increasing quite rapidly. This state of affairs became very serious in the second term of the year 1889–90, when in some instances the consolidation of classes, which was necessary under the circumstances, gave us divisions containing from forty-five to sixty-five students each, and entailing upon the able-bodied members of the department such an amount of extra work as to interfere somewhat with its efficiency. The reorganization of the department at the close of the year, whereby we are to have hereafter four instructors instead of three, has supplied the needed relief, and we have reason to expect increased activity and efficiency in our work.

In spite of the difficulties above described, not only have the higher courses offered in previous years been continued in all cases where there were any students desiring to pursue them, but a course in the Method of Least Squares, designed especially for students in the Colleges of Civil Engineering and Mechanics, and a Seminary course for graduates have been added to the list, and there has been no break in the continuity of our work. In addition to the courses in the elementary subjects of Algebra, Solid and Spherical Geometry, Plane and Spherical Trigonometry, and Plane Analytical Geometry, all of which are prescribed for the Bachelor's degree, courses have been given in the following higher subjects:

In 1888–89: (1) Differential and Integral Calculus, elementary and advanced courses; (2) Analytic Geometry of Space; (3) Conic Sections, elementary course; (4) Higher Plane Curves; (5) Differential Equations; (6) Method of Least Squares; (7) Quaternions; (8) Projective Geometry.

In 1889–90: (1) Differential and Integral Calculus, elementary and advanced courses; (2) Analytic Geometry of Space; (3) Conic Sections, elementary and advanced courses; (4) Theory of Determinants; (5) Differential Equations; (6) Method of Least Squares; (7) Quaternions; (8) Seminary course for graduates.

In default of students to elect them, the course in Differential and Integral Calculus for non-science students and the course in Advanced Conic Sections were omitted in 1888–89, and for a like reason the courses in Projective Geometry and in Higher Plane Curves were omitted in 1889–90.

Detailed statements of the topics treated in the courses, the number of students pursuing them, and the text-books used, are given in tabular form in the Dean's report, and need not be repeated here.

The methods of instruction described in my report of two years ago as then in operation, have been continued without essential change, and the results seem to justify the permanent adoption of the plan of prescribing for our students in the Science courses a series of *Uebungen* supplementary to the regular recitations. Such *Uebungen* are now prescribed in the subjects of Algebra, Trigonometry, Conic Sections, Differential and Integral Calculus, and Analytic Geometry of Space.

The formation of a Seminary course for graduates during the past year marks a notable advance in the work of the Mathematical Department. This was made possible by the presence among us of several graduates, two of them candidates for the degree of Doctor of Philosophy, who were ready to undertake systematic work in some of the higher mathematical subjects not represented in any of the regular undergraduate courses, and not usually possible to undergraduate students. Two undergraduates, however, a Senior and a Junior, took part in this work. The papers presented at its meetings brought under discussion the following topics: The Forms of Number, the Fundamental Nature of the Difference-ratio and the Derivative, the Continuity of Functions, the Generalized Theorem of Mean Value, the Theory of Functions of a Complex Variable and some of its applications, Elliptic Functions, Spherical Harmonics.

The proposed second alternative course in the College of Mechanics, outlined in my report of two years ago (President's Report, 1888, page 61), providing for courses in higher mathematics in the Junior and Senior years, having been brought, by myself, before the Academic Council, was referred to a committee for consideration and recommendation. The question of its adoption must remain in abeyance until a report from this committee is received, but meanwhile several students have been pursuing higher courses in mathematics, either as regular students taking them optionally, or as students at large, and the interest in this higher work has grown considerably during the past two years. It is reasonable to expect, therefore, that in the near future yearly classes will be formed in mathematical work not now possible to students in the regular undergraduate courses as at present arranged. This is probably but one of several ways in which students on the scientific side will call for greater freedom of election, and we shall have to choose between granting it to them as regular students and as students at large.

An increase, by the addition of Solid and Spherical Geometry, in the requirements for entrance to the courses in Science having been proposed by myself in Academic Council in December, 1888, was subsequently considered, and by vote disapproved of, as for the present inadvisable, at a conference held in San Francisco, between representatives of the University Faculties, High Schools, and other educational bodies, and the question, on again being brought before the Academic Council in April, 1889, was, by my own motion, withdrawn; the discussion, however, resulted in adding to the requirements in Algebra and Geometry for the Classical and Literary courses (now designated as subjects 3*a* and 4*a*) the subjects of quadratic equations in Algebra, and regular polygons, and the measurement of the circle in Geometry. These changes will go into effect in 1892, after which the entrance requirements in mathematics will be identical for all courses. Meanwhile, the best equipped of the accredited High Schools had already introduced the subject of Solid Geometry into their curricula, and during the past three years a small group of students—growing larger each year—have entered from such schools with credentials showing that they have gone over the ground covered by our elementary course in Solid Geometry. Such students have been allowed to omit this course, and special sections have been organized for them. In consequence of this new distribution of the classes, the advanced, or A section, of the students in the Engineering courses, as compared with those in the B section, get a somewhat more thorough and satisfactory mathematical training, especially in the subjects of Algebra and the Differential and Integral Calculus; while the advanced section in the College of Letters finish their prescribed mathematical work during the first year, and have three hours a week at their disposal for elective studies during the first term of the Sophomore year. This arrangement gives general satisfaction in the preparatory schools, and provides the proper reward to those who come to the University with the extra mathematical subject to their credit.

The present urgent needs of the department are more books and a cabinet of mathematical models. The most pressing demand for models is in the class in Analytic Geometry of Space; an expenditure of $250 would supply the most essential models needed for this course. A thousand dollars would be necessary to provide a complete cabinet of purchasable mathematical models, such as exists in several eastern universities.

During the past year an important series of volumes has been supplied to the mathematical alcove in the library from the Reese Fund, namely, the fifty-three volumes of the Journal de Mathematiques, from 1836 to 1888, inclusive. This fills a serious gap in our library; but there are many others equally serious, though mostly not so large, and it will be impossible for us to fill them with the annual share that comes to the mathematical department from the Reese Fund. We very greatly need a larger annual appropriation for the purchase of mathematical books.

Respectfully submitted.

IRVING STRINGHAM,
Professor of Mathematics.

PHYSICS.

To the President of the University of California:

SIR: I herewith submit the following concise report for the years 1889 and 1890, in relation to the Department of Physics:

(*A*) 1. In Experimental Physics, the instruction has been given under the advantages of more perfect and complete apparatus for illustration.

2. In the Physical Laboratory, there has been an increased efficiency of the department, due to the regular appointment of two full Assistants, who by assuming the routine duties of the laboratory, set the Associate Professor of Physics free to look after the lecture work needed to give full value to the laboratory instruction. In illustration of this point, it is proper to indicate the course in Electrical Measurements given in 1890, and to be repeated next year, and the course in Mathematical Physics announced for next year.

3. It should be mentioned that an important acquisition has been made of measuring apparatus this year, as indicating the general direction in which the department is growing, and in preparation for Electrical Engineering, soon to be established under the direction of the Professor of Mechanical Engineering.

(*B*) As regards the future, I beg leave to call attention to the following points:

1. That it is desirable to make thorough work in equipping the new quarters for the Department of Physics. To this end, the appropriation for this purpose must be a liberal one; although it is, as yet, too early to give detailed estimates.

2. It is highly desirable that a skilled instrument maker should be employed in this department; for there is already sufficient work to keep him fully occupied in repairing and adapting apparatus.

3. Lastly, I beg leave to renew the request in my last report, for the establishment of some central source of electrical power, a portion of which could be made subservient to the uses of the Department of Physics.

Respectfully submitted.

JOHN LE CONTE,
Professor of Physics.

CHEMISTRY.

To the President of the University of California:

SIR: In accordance with your request, I hereby submit the following report:

The attendance in this department has increased, as shown in the following table:

1886–87	129
1887–88	156
1888–89	185
1889–90	181

This increase in students, with consequent crowding in this and other departments, resulted in the erection of the new Chemical Laboratory, a building just completed at a cost of $60,000. The plans were prepared by Mr. Clinton Day, architect, in conjunction with the head of the department. The building occupies an area of about thirty-six thousand square feet, and will, when completed, contain nearly fifty rooms, giving ample lecture and laboratory facilities for one hundred and fifty students, about twice our present capacity.

The working-rooms are all on one floor, well lighted, and well ventilated. The arrangement of the laboratories has been the subject of much thought and study. In planning both the laboratory and its furniture a most rigid economy has been observed; and it is not too much to say that in no other laboratory with which I am acquainted have so many facilities been obtained for the same money.

The enlarged capacity will enable the department to offer increased facilities for laboratory work in: (*a*) Elementary Chemistry; (*b*) Organic Chemistry; (*c*) Special and advanced work, original investigation, etc.

Up to the present time the instruction in Elementary Chemistry has been given by lectures and recitations *solely*, illustrated by experiments, it is true, but with no opportunity for laboratory work by the student. Nothing can replace this. It is intended to use two of the four recitation hours for laboratory work, thus greatly adding to the student's interest and profit in the subject.

The same can be said of the Organic Chemistry. This important branch can now be taught according to modern methods; a complete laboratory, with connecting combustion and distilling-rooms, will offer facilities equal to all demands of the course.

At a slight expense, the basement can be divided and fitted up for work in advanced and special subjects, such as Water Analysis, Gas

Analysis, Thermo-chemistry, Physiological Chemistry, etc. It is the intention of the department to offer one or more of such courses each year. There has been a demand for them, and a number of students will avail themselves of them.

This increase in the work demands a corresponding increase in the teaching force. A large number of students may not at once avail themselves of these advanced courses of instruction, nevertheless, they exert a healthful influence upon the whole University. They help to give tone and character to the department, and are worth all they cost, and should be fostered in every way possible. This will be possible for the first time when the new laboratory is suitably equipped and occupied. The importance of equipment cannot be overstated. We shall fail to get the full benefit of the new laboratory if omissions are made in the furnishing and equipment of the same.

I would most respectfully suggest that a summer course in Chemistry be offered to teachers during their summer vacation. Experience has shown that great good can be done to schools of the State, and at the same time a host of warm and helping friends secured to the University. Harvard has maintained such a school for a number of years. Michigan University this year opened its doors in this department to teachers, and other institutions of rank in the East are doing the same. There is a willingness on the part of the present staff of instruction to coöperate in this work, and to give a part of their summer vacation to it; with the addition of a new assistant, the course could be successfully carried on. I would urge very strongly that provision be made at an early date for such instruction, so that a timely announcement of the same be made.

The department needs a small library in the reading-room, where it can be consulted by students at any moment. The habit of verifying statements and opinions by reference to authorities is invaluable; in science it is fundamental. A beginning can be made at a moderate expense, and should not be long delayed. Old duplicates might be transferred from the General Library, and would form a nucleus for such a reference library.

The present method of maintaining the chemical laboratories should be changed. The department is now allowed a fixed sum, out of which all expenses for the laboratories, lectures, new apparatus, collections, etc., must be defrayed. Of this sum, by far the larger part goes towards the maintenance of the students' laboratories, and will become larger as the number of students increases. The more material and apparatus consumed in these laboratories, the less there is left for the lectures, new apparatus, etc. Hence, the laboratories cannot be maintained on as liberal a basis as they might be. This can be remedied by turning the students' fees into the chemical appropriation for the following year, instead of into the General Fund. The general chemical appropriation is now $2,400. The students' fees amount to about $1,100 (average). A general appropriation of $1,500, together with the fees, would enable the department to be more liberal with laboratory supplies, without calling on the University funds for increased appropriation.

Respectfully submitted.

W. B. RISING,
Professor of Chemistry.

GEOLOGY AND NATURAL HISTORY.

To the President of the University of California:

SIR: I have received your request that I send you a report of the work, the present condition, and the most urgent wants of my department. I have the honor to report as follows:

The work and condition of the department have not greatly changed since my last report; I have nothing, therefore, to add, except that there is a very gratifying, and, I believe, an increasing interest manifested by the classes.

But the wants of the department, so long and so keenly felt, are still unfilled and are becoming more pressing every year. In Geology there ought to be provision for laboratory work and Palæontology, and especially for field work in the summer. An Assistant in Geology, to take charge of this work, will soon be a necessity. But this, perhaps, can be put off a year or two. The greatest want in my department, and, as I believe, in the University, is practical work in a biological laboratory. This kind of work is now exciting so much attention, that there is scarcely a college, even of the second class, in the country that has not its biological laboratory. It is considered everywhere a prime necessity. I am sure that such a course here would immediately have large classes.

There are two alternative views as to meeting this want that might be entertained: Either to endow a full chair and fill it with a man of already established reputation, or else to commence in a small way with a laboratory assistant, under my general supervision, and supplementing my course on Comparative Zoölogy.

If the latter course be adopted, it can be carried out with little expense. A suitable room can be obtained in the new chemical building. The fitting up with tables, microscopes, dissecting instruments, etc., would not, I believe, cost more than $1,500, or at most $2,000. Besides this there would be the salary of the assistant, perhaps $1,200 to $1,500.

I strongly recommend that something be done to meet this want at the beginning of the next session.

Respectfully submitted.

JOSEPH LE CONTE,
Professor of Geology and Natural History.

TECHNICAL SCIENCE.

MECHANICAL ENGINEERING.

To the President of the University of California:

SIR: Since the publication of my last report two years ago no new additions have been made to the laboratory and machine shops, and I therefore refer to said report regarding the present condition, progress, and wants of the department under my charge.

The extension of the laboratory and its equipments are not only essential regarding mechanical engineering in general, but form the necessary basis for a course in Electric Engineering.

Mechanical Engineering deals with general principles of dynamics in their thermal, hydraulic, and electric applications. These subdivisions are interdependent and constitute, as a whole, a laboratory for Mechanical Engineering.

Respectfully submitted.

F. G. HESSE,
Professor of Mechanical Engineering.

Civil Engineering and Astronomy.

To the President of the University of California:

Sir: In compliance with the request embodied in your circular to the several departments of our University of date of the fifth instant, I hereby report concerning "the work done" in my department "during the two years closing June 30, 1890, its present condition, and its most pressing wants."

The courses of instruction formerly given have been enlarged, broadened and improved, and a new topic, demanded by the needs of civil engineers—namely, Sanitary Engineering, including the water supply of cities and towns, and their sewerage—has been introduced into the college curriculum.

The instruction in Practical Astronomy and Geodesy has been developed to the full requirement of students in the Civil Engineering course.

This year, for the first time, in addition to working up the clock correction by various means, and determining the latitude of the Student's Observatory by several different methods, the class has practiced the electric telegraph system of determining longitude by corresponding over the wires with the Lick Observatory.

The Observatory course has now become so systematized that at its completion the student may proceed unaided in the prosecution of such work, and use with accuracy the instruments and astronomical tables therein employed.

The number of students in this department has been increasing steadily during a number of years past, and some of the classes are larger than ever before.

A most pressing want, more and more felt, is a building designed for and suitable to this department, and containing lecture-rooms of good size, draughting-rooms, apparatus-rooms on the ground floor, a room for displaying specimens of building materials and engineering devices, and also studies for the instructors. In times past and until this date, the Department of Civil Engineering and Astronomy, although bearing on its class rolls one of the largest numbers of scientific students, has been cramped in two small rooms, without southern illumination or direct sunlight, so much needed in astronomical illustrative lectures, on the third floor of the North Hall.

Its accommodations are entirely insufficient for its large and growing classes.

We have been obliged to put thickly together in one of our lecture-rooms a number of draughting tables, in the labyrinth of which the instructor and students must move as best they may.

Many thousand dollars worth of apparatus are in place on the third floor of this wooden building, the North Hall; and in case of conflagration would probably be entirely destroyed.

The surveying instruments must be carried up and down three flights of stairs at each field exercise, to their great risk and, sometimes, damage.

In view of these facts and many more which might be enumerated, I unhesitatingly declare that a new and commodious building appropriate to the work of this college course is urgently needed by the growing necessities of the case; and that, in my opinion, it should be the next one constructed.

In all other respects, I regard the department as in a very satisfactory condition.

Respectfully submitted.

FRANK SOULÉ,
Professor of Civil Engineering and Astronomy.

Mining and Metallurgy.

To the President of the University of California:

Sir: I have the honor to submit the following report concerning the progress, condition, and wants of the department under my charge:

During each of the two years just passed I have conducted the following courses of instruction:

Mining, three lectures per week for the entire year; number of students, seven each year.

Metallurgy, three lectures per week for the entire year; number of students, ten the first year and twelve the second.

Assaying, lectures with laboratory practice, six hours per week for the entire year; number of students, eleven the first year and seven the second.

Metallurgical Laboratory, six hours a week for the year; number of students, seven the first year and three the second.

In addition to the work of regular class-room instruction, excursions to some of the principal manufacturing works in the vicinity have been arranged for the students, such as the California Wire Works, the Union Iron Works, the Pacific Rolling Mills, the Giant Powder Works, etc., and it is intended to make these trips an important feature of the term work. During the vacations students have been advised regarding the best mode of utilizing their time in visits to more remote mines and metallurgical works, and in some cases positions have been secured where they could have actual field practice.

During the last year the course in Metallurgy has been changed from the Senior to the Junior year, so that now all the mining students come under my personal instruction two years instead of one. The results of the change have been eminently satisfactory, not only from the increased interest in the technical work, but also in other collateral subjects, the practical value of which it was formerly often difficult to make the students realize until it was too late.

During the last two years the detailed plans have been drawn and the following work executed under my direction:

1. Two new iron-clad crucible furnaces have been erected in the

Upper Assay Laboratory. These have been urgently needed for a long time.

2. A complete dry crushing plant has been erected in the Metallurgical Laboratory. This consists of a Dodge rock-breaker, on the upper story, from which the crushed ore passes through the floor by chutes and a horizontal screw conveyer, either to the right, to a pair of sixteen-inch Krom swinging-pillow-block steel rolls, or to the left, to a six-inch Sturtevant centrifugal mill. From either of these machines the ore passes to the elevator pit, whence it is elevated by a bucket conveyer to the top of the second story, whence it is delivered to a revolving Krom trommel, where it is separated into four sizes, the coarse particles being automatically returned to the crushing machine. All this apparatus is housed in and connected with a suction fan discharging into bag filters, so that the laboratory may be kept free from dust while crushing, and at the same time no valuable ore dust may be lost. The entire plant has been carefully designed to illustrate the best practice in this class of work, and at the same time to allow the accurate "clean-ups" so necessary in treating small lots of ore.

3. A pair of experimental arrastra pans, with mullers of the same size and weight, designed to test the relative value of iron and stone for amalgamating gold ores with a thoroughness that has never been done before. The completion of the apparatus has been delayed by the strike now existing in the foundries.

4. A pair of three compartment Hartz ore-jigs, arranged for fine and coarse ore-jigging, to be used in connection with the roller crushing plant above mentioned.

In addition to the above, numerous minor improvements have been introduced, such as a set of automatic mill samplers, steam driers for concentrates, a set of apparatus for the electrolytic assay of ores, an improved apparatus for making chlorination tests with gold ores, and others too numerous to mention, but taking in the aggregate considerable time and thought.

I have also to report the gift by Mr. Eckley B. Coxe, of Drifton, Pennsylvania, of a working model of his improved Gyrating Ore Screen, similar to the one he had on exhibition at the late Paris Exposition. It has proved a valuable addition to our working plant.

During the last two years, besides a considerable amount of experimental work, coming under the head of regular instruction, a number of investigations have been under way, among which may be mentioned the following:

On the treatment of certain nickel ores.

On the relative advantages of stone and iron in amalgamating gold ores.

On the value of certain Alaskan coals.

On a new and improved method of making chlorination tests of gold ores.

On the electrolytic determination of antimony.

Most of these investigations are nearly in a shape for publication. They have been carried on whenever possible with the aid of my more advanced students, and it has been found a means of interesting them in their work in a manner that mere routine work never would have done.

A number of other interesting investigations have been projected, about which it is as yet too soon to speak.

For the coming year there is no pressing want which is not supplied. The special legislative appropriations made for the purpose of equipping the department have been most carefully administered, and, with economy, will suffice to complete the plans originally laid out. But at the end of the coming year the resources of the department will be exhausted. The annual allowance of $300 now made from the General Fund barely covers the expense of materials actually used by students in the Assaying Laboratories, and as this sum is annually returned by them in laboratory fees, this leaves the annual appropriation for improvements and maintenance practically nothing.

There will be, therefore, at that time an urgent need of a fund for that purpose of at least $1,200 per year, that the efficiency of the department may not suffer. Appeal to the California Legislature for special appropriations for this department has never been in vain, but this recourse, since the passage of the General Appropriation bill, no longer remains; hence, at the end of the coming year, much of the work I have outlined must cease unless such an allowance can be made from the General Fund.

Respectfully submitted.

S. B. CHRISTY,
Professor of Mining and Metallurgy.

AGRICULTURE, ENTOMOLOGY, AND BOTANY.

To the President of the University of California:

SIR: In accordance with your request that I should transmit to you a summary report on the progress made in the department under my charge during the past two years, and on its present condition, I respectfully submit the following statement:

The salient features of the changes that have occurred within the period named have mainly resulted from the passage of the Hatch Act for the endowment of agricultural experiment stations; that law, so far as its financial features are concerned, having now been in force for three years. Prior to its enactment this department was without proper or adequate rooms, equipment, and staff, both for instruction and experimental work, the latter especially being hampered by unsuitable laboratory accommodations and appliances; as regards cultural experimentation, confined to the exceptional soils and climate of Berkeley, supplemented by the somewhat uncertain action of voluntary observers throughout the State; and as regards viticulture, by the three culture stations under private auspices. With all these impediments and the financial uncertainties involved in its dependence upon the contingency of legislative appropriations, the work accomplished, as summarized in the report lately issued, nevertheless may claim to compare favorably with what, during a similar period, has been done anywhere else. Yet the limitations necessarily imposed by undue financial stress could not fail to be seriously felt, and the kind and amount of work expected of the station was getting to be totally disproportionate to its available means. The enactment of the Hatch bill, and, to some extent, that of the legislative bill creating a more adequate permanent endowment for the University, have concurred in placing both branches of this department upon a reasonably satisfactory basis.

THE STATION BUILDING AT BERKELEY.

The most fundamentally important measure for both sides of the work—educational and experimental—has been the erection, in the summer of 1888, of a spacious building specially designed for the purposes of the department. Referring to the report ("*On the Experiment Stations of the University of California*"), lately issued, for details, I only state that the building proves exceedingly convenient in all respects; and while it may be regretted that more durable material than wood was not used in its construction, the eminent timeliness of its erection, and the facilities it affords for our work, amply justify the departure from the more desirable system of brick or stone structures. It may be noted here that the $3,000 allowed to be used for building purposes under the Hatch Act was expended upon this structure, together with $7,000 from the University Fund; while a portion of the ordinary work of the Central Station was, for the year 1888, paid out of the Experiment Station Fund. The rest of the appropriation for the fiscal year 1887–88 was spent upon the preliminaries for the establishment of the outlying sub-stations for cultural experiments, that had so long been in contemplation. During the subsequent two financial years (1888–89 and 1889–90), more especially under consideration here, the entire amount of the United States appropriation of $15,000 per annum has been expended upon the establishment, equipment, and maintenance of the outlying sub-stations, together with such additions to the equipment of the Central Station at Berkeley as were necessary to make it commensurate to the large and rapidly increasing demands upon it.

Among the more important additions made to the *laboratories* of the department, at the expense of the appropriate funds, are the following items: Work tables sufficient for the accommodation of ten special students (it being understood that the work in general chemistry is first done in the general laboratory of the University), with outfit of reagent bottles, gas lamps, etc. A "steam apparatus" specially designed for station work, and accommodating a large volume of work at one and the same time, has been procured from Germany at a cost of about $600, and forms the foundation of the laboratory appliances. It furnishes currently an abundant supply of distilled water of two grades, and can simultaneously be used for distillations of other substances; it is also provided with steam drying-chamber, block-tin water baths, etc. It is covered by an asbestos hood.

A good microscopic outfit, including four microscope stands and a first class "mineralogical microscope," with mechanical stage, polarizers, etc., has been provided. Considering, however, the large amount of microscopic work which is currently required of several of the staff, additions to this outfit are still called for, as three of the stands are but small and purchased for the use of students. An excellent spectroscope with two prisms; an additional (short arm) analytical balance; new combustion furnace for organic analysis; stand with cooling tank, allowing of the making of six "Kjeldal" nitrogen determinations at one time, and many other minor sets of chemical and physical apparatus, have also been added.

INSTRUCTION.

The only material change in the kind or amount of instruction given has been the admission of students to the Agricultural Laboratory; an arrangement long needed, but for which, in the absence of sufficient laboratory accommodation, there was no opportunity until the new building relieved the situation. Heretofore, it has frequently occurred that students desiring to pursue some special work in the line of the agricultural industries had to oscillate between the general chemical laboratory and that of agriculture in order to attain this object, thus incurring great inconvenience and loss of time; a state of affairs that, of course, greatly discouraged the pursuit of such studies. This is now effectually remedied by the provision for working desks for special students in the new building. The ten places thus far established will probably be sufficient for some time to come, as it is not desirable that others than advanced students, who have already gone through the elementary course in the general laboratory, should be admitted. We are sometimes obliged to deviate from this rule in favor of students whose time is so limited by circumstances that they can take only a short course of lectures and laboratory practice. But the extent to which such students encroach upon the time of the laboratory assistants, renders any considerable extension of such privileges undesirable. Should the number of laboratory students increase materially, it would be impossible to carry on the work of the station without making special provision for their instruction by an addition to the *personnel* for that special purpose. It should, however, be noted that advanced students usually pursue some line of work bearing directly upon matters within the scope of the station, so that at times they are of material assistance in that respect, while at the same time their experience herein is of great value to them in rendering them familiar with the methods to be pursued in logical investigation or experimentation. On these grounds, I consider that when the work of the station and of the college are combined in good faith, the legitimate objects of each are furthered by the interconnection; the more, as at this time, one of the great difficulties in the way of the efficiency of both colleges and stations is that of finding a sufficient number of well qualified officers. If, among the numbers of young men throwing themselves into professional life, a larger number would devote themselves to the filling of the thin ranks of those really qualified for the work contemplated by the Morrill and Hatch Acts, there would be fewer unsuccessful lawyers and physicians. For agricultural science now offers better rewards to a great many than are now earned in the overcrowded ranks of physicians, assayers, and analytical chemists.

In the other courses of the college but little change has been made, except that the more ample room and resources now permit of better illustration of lecture courses, rendering them both more attractive and more instructive. The collections of soils, agricultural and other products, the entomological and botanical specimens, etc., are now for the first time so placed and distributed that they are fully accessible, and whatever is wanted can be found, even though not yet fully arranged. A special reference library, constantly within easy reach, has, since the adoption of the new rules for the general library, become a matter of absolute necessity; and a good beginning in this direction has been made during the financial year just past, by the purchase of a number of needful works, and of a full set of the county maps of the State, at an aggregate cost of about $400. Our exchanges with other stations, colleges, and societies are fast accumulating a valuable set of documents, which, at present, are being temporarily filed, but will ultimately be placed in proper cases in the reading-room on the second floor of the building. This room, occupying the middle portion of the southern side, has been provided with tables and chairs, and the floor covered with matting, so as to present an attractive appearance; its seats are frequently occupied by students perusing the agricultural and county papers received (mostly by way of donation or exchange), as well as the latest station bulletins. Whenever financially possible, it should be provided with suitable cases for the permanent reception of the books and document files.

The courses in Agricultural Chemistry, and that in Vinification, given by myself, and those in Practical Agriculture and Horticulture, under the efficient management of Mr. Wickson, continue, as in the past, to be only sparsely attended; but those attending are earnest students, usually taking a special course shorter than the four years' curriculum leading to a diploma. A two-year course, including only the subjects directly pertinent to agriculture and horticulture, is evidently what is most commonly wanted at present; and, while this time is altogether insufficient for thoroughness in any of the branches taught, it seems, nevertheless, to be sufficiently useful to entitle it to at least the same attention as the full course, at the present time. While we should reserve the diploma of the University strictly for those complying in full with the requirements of the regular course, we are, nevertheless, in my view, morally obligated to supply the demand actually existing, such as it is.

It should not be forgotten that while we are not, as yet, given opportunity to impart instruction to farmers' sons as much as we could wish, we are actually giving a very large amount of information and instruction directly to the farmers themselves, both through our publications and (to an extent often amounting to serious inconvenience) by a heavy and constantly increasing correspondence. It would be vastly less work for us to teach large classes of students than to supply the demand for direct information by letter, as we now do. Yet I conceive that under present conditions, the greatest scope of the institution for usefulness to the agriculture of the State lies just in that direction, in connection with the experimental work. The rapidly advancing exhaustion of the soil, under improvident culture, will in due time bring about a natural demand for the education of farmers' sons in the principles of rational agriculture.

A telling case in point is that of the course of Economic Entomology, conducted by Mr. Wickson, in the absence of a specialist in that science. This course is quite numerously attended, as the direct result of the demand for information on the habits and modes of repressing insect pests. In this matter "the shoe has begun to pinch," and the results achieved by its investigation have been such as to command the attention of the whole community. The same will happen in respect to the principles and practice of rational agriculture, whenever the soil shall cease to yield profitable crops to even careless culture. And that time is fast approaching.

The division of Botany, also, has been materially benefited by the removal of the mass of material that used to cumber its lecture-room, and by the transformation of the old agricultural laboratory into a study and private laboratory for the Assistant Professor. For the present, the chief improvement needed is the permanent employment of an assistant, who shall aid in arranging and labeling the collections now in hand and constantly being increased—partly by contributions, partly by the active interest of Professor Greene himself. The increase of the botanical classes, and the constant call for special instruction, for the determination of economic and other specimens referred to him, and the correspondence involved in the latter class of work, leave him little time for the care of the collections, even if it were desirable that the time so valuable for higher work should be given to merely perfunctory duty.

ADDITIONS TO THE DEPARTMENT STAFF.

As the increase of work resulting from the establishment of the substations rendered an increase of the staff absolutely essential, since both the volume and variety of work rendered it impossible to be further borne by the former *personnel*, an additional assistantship was first established in 1888, and continued for sixteen months. But the need of a greater number of hands and heads became so urgent, that upon my recommendation the salary corresponding to that position was thereafter subdivided so as to provide for a clerk to the Director of the station, and a foreman of the cellar, to act under the chief assistant in viticulture, while the second assistant was assigned exclusively to laboratory work. This subdivision afforded considerable relief to the pressure of home work; but it still left the Director to deal single-handed with the detailed supervision of the numerous stations, involving not only an excessive multitude of details, but also frequent absences quite incompatible with his duties as an instructor, and also with a proper supervision of the whole of the station work. After a temporary appointment of a competent person (Mr. W. G. Klee, formerly chief gardener for the experimental grounds of the Central Station) to supervise the planting of the three stations then established, during three months in spring, 1889, the position of "Inspector of Stations" was permanently created in June of that year; and the same incumbent has since discharged the duties of the position very acceptably.

While this increase provides reasonably for immediate needs, and with the present incumbents enables us to carry the work, the further increase of stations and the corresponding increase of interest on the part of the people of the State will soon call for more heads and hands to cope with the demands made upon us. This is especially the case in respect to the work in entomology, which is now, as it has been for a number of years, under the charge of Mr. E. J. Wickson, who is at the same time lecturer on Practical Agriculture and Superintendent of the grounds of the Central Station. Mr. Wickson does not claim to be a specialist in entomology, but undertook the work in order to prevent its going by default. But in the course of time not only has the increase of students compelled a subdivision of the classes, but the continual demand for the determination of insects infesting all kinds of economic plants, together with questions regarding their repression, creates a heavy exaction in the way both of investigation and of correspondence, that clearly calls for the employment of a specialist to take charge of either or both branches of entomological work. It is hoped that the passage of the "new Morrill bill" now before Congress, providing for additional financial aid to the agricultural colleges, will enable us to make this extremely needful addition to the staff of the college and station.

Another addition urgently called for and repeatedly recommended by me in former reports, is the appointment of a competent veterinarian, both for instruction in this important branch and for the work now often asked of the station, but which cannot be done under present arrangements. The increase of diseases of domestic animals in the State, and the failure of the Legislature to provide for properly dealing with this important subject, renders its efficient handling by the station doubly needful.

It must be admitted that the general character of the experimental work now occupying most of our time is essentially fragmentary, for the reason that the demands made upon the station for special information of all kinds practically reduces the systematic pursuit of any special line of investigation to the utilization of the data that incidentally come into our hands. While the interest in our work, demonstrated by the heavy demands made upon us, is from one point of view a most important feature, yet we stand in unfavorable contrast to Eastern and European stations, in that we fail to pursue to their ultimate consequences our observations in our new and untrodden field, from sheer want of time to do so. This evil is aggravated by the fact that much of the time of the laboratory assistants is necessarily given to the instruction of practical students, and to the preparation for lectures, in term time. It is therefore highly desirable that so soon as practicable our working force in the chemical laboratory shall be increased by the appointment of an additional assistant, who shall be competent either to take up needful lines of investigation himself, or to relieve the senior assistants from some of the work that now renders it impossible for them to do more than cater to the current demands made upon the department.

IMPROVEMENTS ON THE EXPERIMENTAL GROUNDS AT BERKELEY.

The improvements on the grounds of the Central Station have mostly been made at the expense of the University Fund; they may be summarized as follows:

(*a*) The extension of the arboretums upon the dry hillsides of the eastern part of the University domain has afforded means for trial of many tree growths native in other parts of the world, and many such are now growing thriftily.

(*b*) Desirable changes have been carried out in the Garden of Economic Plants, by which room is secured for a greater number of plants; adjacent ground has been prepared to serve as annexes to the garden; a relabeling of a large part of the plots, and of individual plants and trees, has been accomplished. The extension of the orchards has progressed by addition of a large number of new varieties of fruit for trial in comparison with the old standard varieties, and by importation of new varieties, especially figs and olives from foreign sources.

(*c*) Improvements have been made in the propagating houses, by which these ancient structures are enabled to continue their usefulness for a period. The old heating apparatus, which had become wholly inadequate, was replaced with a Harvey Hot-water Heater, with system of pipes, and this has proved quite satisfactory. The benches throughout, and the posts and sills in the larger house, which had become very insecure through decay, have been replaced with new; the sashes have been repaired, the glass reset, and new glass added as required, so that the roofs will be watertight during next winter. After finishing these repairs the houses were given two coats of paint, and are now in better condition than for a number of years, though in their best estate they are seriously inadequate to the needs of the institution, and a disappointment to the visiting public.

(*d*) A proper system of underdrainage, which has for years been put forward as a pressing need of the agricultural grounds, has been in good measure secured during the last two years. The system so far includes the greater part of the orchards, the swales in the area set apart for field culture, and a part of the garden and its annexes. The details of this important work are given in our recent publications. The best hard-burned tiles were used, and their operation during the unusual rainfall of last winter clearly demonstrated the excellence of their laying and the value of underdrainage in general.

(*e*) Another important addition to the equipment of the institution is a building arranged for the storage of seeds and permanent exhibition of grains, grasses, etc., in sheaves. The one-story frame structure (forty-five by twenty feet), which was displaced by the erection of the new Agricultural Experiment Station Building, was moved to a convenient place on the agricultural grounds, placed upon a new foundation, well repaired and repainted, and furnished with an excellent interior fitting-up of seed-drawers, bins, tables, etc., and now constitutes a very satisfactory seed house, secured at very small outlay.

(*f*) There has been an improvement of the roads and walks, and thinning out of the windbreaks and tree belts, continually in progress, as time could be spared from other work.

THE OUTLYING SUB-STATIONS,

Intended mainly for culture experiments in the several climatic subdivisions of the State, at this time are four in number, representing, respectively, the Sierra Foothills, the San Joaquin Valley, the Southern Coast Range, and the Valley of South California. The estimated expense of their maintenance, based upon the experience of the last two years, will fully exhaust the $15,000 provided for the purpose by the "Hatch Act" of endowment. As the expenses of the Central Station at Berkeley, including the salaries of all employés, except the Inspector of Stations, are almost wholly borne by the General Fund of the University, in lieu of the special legislative appropriations periodically made prior to the enactment of the University tax bill, it may fairly be claimed that in no State has the intent of the endowment for agricultural experimentation been so liberally, and in few so literally, fulfilled as in California.

The three stations first established—respectively, near Jackson, Amador County, Paso Robles, San Luis Obispo County, and Tulare, Tulare

County—are now quite fully equipped, and planted with upward of six hundred varieties of culture plants each, of which a single variety frequently represents from two to six different experiments as to grafting, mode of culture, fertilization, irrigation, etc. The fourth station—that lately established near Pomona, for Southern California—will, it is hoped, be ready for occupation in October or November of the current year.

The land upon which these sub-stations are located has been acquired in fee simple by donation, with reversion in case of abandonment, and amounts in the aggregate to one hundred and sixteen acres; in two cases (the Foothill and Southern California Stations), water for irrigation has also been donated. The buildings for these stations have been erected by subscription in the communities or counties interested, to amounts varying from $2,400 to over $5,000; the latter in the case of the Foothill Station, where not only the buildings, but grubbing, fencing, the cutting and grading of one and a half miles of road, together with a thoroughbrace wagon and team, were included in the donation. I am convinced that the direct interest in the stations thus necessarily established in the surrounding community and country will contribute materially to their future usefulness. A little impatience in regard to the development of results is greatly to be preferred to the indifference which usually accompanies an entirely free gift, whether to communities or individuals. That this interest will develop progressively as, in time, practical results can be shown, is already manifest as regards the culture experiments with annuals, especially cereals; the extensive collections of fruits will, in years to come, be doubtless even more fully appreciated. For further details I respectfully refer to the report on these stations, just published.

THE SOUTH CALIFORNIA STATION.

It may be proper to allude, in this place, more in detail to the station for Southern California, since no official statement regarding it has yet been publicly made, and its location has given rise to some newspaper discussion and local feeling.

As stated in a former report, suggestions for the establishment of the station of Southern California were early received; one from Santa Barbara, two others from San Diego. As these localities were situated at the opposite extremes of the climatic region to be represented, I could not view them favorably, though acceptable in other respects. During the season of 1889, I devoted some time to the study of the central portion of the region (viz.: the "valley of South California," as it may properly be called) which contains the majority of the population, and the most extensive connected area already under culture, or susceptible of the same, to be found south of the Sierra Madre. It always seemed to me that the station should be located at some point in this great valley; and after quite a full examination of its soils and climatic features, I came to the conclusion that the nearest approach to a location reasonably representative of the whole would be on or near the water divide, between the rivers San Gabriel and Santa Ana. That divide (marked by the San Antonio Creek, which in times past has flowed either way) is screened from the too direct impact of the coast winds by the San José hills on the west, and by those of the Chino Ranch on the southwest; and as regards soil, possesses both a considerable variety and, in places, the generalized "red mesa soil" that has been found so favorable to the citrus tribe. As it became necessary to act in the matter of this station within the year, I took the needful preliminary measures, and on July seventh of the present year addressed to the Chairman of the Committee on Experiment Stations, Regent J. F. Houghton, the following report:

BERKELEY, July 7, 1890.

Regent J. F. HOUGHTON, *Chairman Committee on Experiment Stations:*

DEAR SIR: In accordance with my general instructions, and the assent of your predecessor, Regent J. W. Martin, I have visited the locations offered for the experiment station for the southern region of California, combining this object with my annual inspection of the stations at Tulare and Paso Robles.

The conditions precedent for the establishment of a station, as heretofore formulated—the donation of a suitable tract of land, and provision for the erection of the necessary buildings—having been complied with by two distinct localities, namely, Pomona and Riverside, it becomes necessary to make a choice between them.

The considerations which have governed in the selection of sites for the other stations have been formulated as follows:

1. Each station should be representative of as large an area of agricultural land as possible, with respect to climatic conditions first of all, and secondly with respect to soil conditions.
2. Agricultural regions of which the adaptations and peculiarities are still uncertain should receive attention first, since it is here that the greatest volume of work remains to be done; while in regions that have been settled up long ago, the trials of individual culture plants that may come into question may be intrusted to intelligent individuals.

The region intended to be represented by the station now under consideration extends along the coast, from Santa Barbara to San Diego, and, inland, from Redlands to the interior valleys of San Diego County. There would be ample justification for the establishment of two distinct stations within this wide region, embracing such distinct climates. But so long as our means do not permit, nor are likely to permit, so far as we can foresee, the maintenance of more than one station, the best solution would seem to be that of a compromise location between the coast and the interior climates. With this view I inspected the valley from Los Angeles to Redlands some fifteen months ago, and came to the conclusion that a location upon the divide between the two watersheds of that valley, the San Gabriel and Santa Ana Rivers, offers the most suitable conditions; a climate still tempered by the sea breeze and occasional summer fogs, yet so near that of the remoter portions as to measurably represent also that of the San Bernardino Valley proper. As regards soils, too, I found that "generalized" soils fairly representative of the valley at large could readily be found near Pomona, which occupies the divide.

Upon broaching the subject to the community, through some of its prominent citizens, I found a favorable disposition toward the object contemplated, but in view of financial stress then existing, it was thought best to defer for a time the attempt to raise the required funds.

A few months prior to the end of the financial year I informed some of the parties who had interested themselves in the matter, that it would be necessary to bring it to a point, as other sections of the State were interesting themselves in securing the only additional station which the limits of the United States Station Fund would permit us to establish.

The consequent agitation of the subject has resulted in two offers of suitable tracts of land, made, respectively, by the Pomona Land and Water Company, through its President, Dr. B. S. Nichols, and by Richard Gird, Esq., proprietor of the Chino Ranch; each accompanied by the requisite amount of irrigation water. A guaranteed subscription of funds, to the amount of $3,000, was also made. The documents setting forth these offers are inclosed herewith.

Having been informed that a corresponding offer would be made by the citizens of Riverside, with a view to the location of the station at or near that point, I visited that community and was pleased to find a most liberal and appreciative spirit manifested. The tract of land offered by the Riverside Land and Water Company comprises forty acres, situated but a short distance beyond the present town limits, and representing both the "red mesa" soil, on which citrus culture has been so peculiarly successful, and some more properly agricultural land in the valley of the Tequisquite arroyo. The site in itself is unexceptionable, and its location very attractive; water is offered from either or all of the supply systems of Riverside, as well as an ample subscription of funds for the erection of buildings. While I have not been furnished with written documents embodying these offers, I have not the least doubt that they would be abundantly made ood should the location of the station be made there.

As regards the comparative eligibility of the two localities—Pomona and Riverside—there is a clearly cut issue, which I would formulate thus: "Shall the station for South California represent the widest extent of country possible, or shall it, on the other hand, represent the specialty of citrus culture?" If the latter, then Riverside, where this industry has been carried to its highest perfection through a combination of rare and most intelligently directed energy, with a peculiarly favorable soil and climate, may claim precedence of all. If, on the other hand, the long and wide stretch of coast lands and climate are also to be represented and measurably benefited by the station, then the rather exceptional climatic and soil conditions of Riverside militate against its usefulness, and Pomona will still, in my opinion, present the most favorable conditions for attaining results of wide applicability.

It rests with the Regents to decide which of these two distinct objects shall be mainly subserved by the new station; after this is decided, it will be easy to determine upon the most advantageous one of the several tracts offered.

Respectfully,

E. W. HILGARD,
Director of Experiment Stations.

Upon full discussion of the subject at the Regents' meeting held on July eighth, it was decided that the station should be located near Pomona, as originally suggested by me. I thereupon immediately proceeded to that place to determine the details of location, and on my return addressed to the Chairman the following communication:

BERKELEY, July 14, 1890.

Regent J. F. HOUGHTON, *Chairman Committee on Experiment Stations:*

DEAR SIR: Pursuant to the decision of the Regents locating the station for South California near Pomona, I have at once revisited that locality in order to expedite matters as much as possible, and insure the beginning of operations for the coming season; also, in order to determine which of the alternative offers made of tracts of land should be accepted.

I returned last evening, and as the result of my further investigation would recommend the acceptance by the committee of the offers made by Mr. Richard Gird, of "thirty acres of land described in the first offer" (located on S. 34, T. 1 S., R. 8 W.), "with a proportionate amount of water, and ten acres of the naturally moist land described in the second proposition herewith."

From a detailed inspection, I find that the thirty-acre tract will have about five sixths of the reddish mesa soil that is deemed specially appropriate for citrus fruits, and one sixth of the gray gravelly soil that characterizes the "washes" of the Sierra Madre. In order to include this large proportion of the mesa soil proper, it will be necessary to have the tract somewhat "L" shape.

For the location of the detached tract of ten acres, I explored in detail the northern limit of the moist lands, in order to obtain it as near the other tract as possible without detracting from its special character. I found this realized in a ten-acre tract near the center of Sec. 10, T. 2 S., therefore a trifle over two miles due south of the main tract, from which an avenue runs directly to it, minimizing the distance to be traveled by teams.

While this adoption of the plan of two distinct tracts will increase somewhat the expense and trouble of the station work, it seems difficult in this case to do justice to the region intended to be represented by the station, without such segregation. The dark loam soil of the moist lands is extensively represented not only in the interior valleys, but also along the coast, and its capabilities should be thoroughly tested. The ten-acre tract is sufficiently large to permit us the covering of expenses, in part, by the growing of hay for the team, as the land is profusely productive, and four out of the ten acres would probably suffice for the ten tons of hay needed. I therefore recommend the acceptance of those two tracts, substantially as marked on the map herewith; with a possible transfer of the particular "ten" from No. 37 to either of the adjacent ones (No. 38 or No. 36), the stakes having been lost in the tall grass at present.

As regards the buildings, I have handed to the Secretary of the Pomona Board of Trade a copy of the plans thus far used in two of our station buildings, and have suggested the formation of a building committee to take charge of the matter, let the contract, and supervise the execution of the work, as was done at the former stations. I understand that the funds subscribed are to be collected immediately, and so soon as Secretary Bonté shall have been notified that the amount of $3,000 is deposited in bank to the credit of the building committee, I propose to begin arrangements for stocking the station for work during the coming season.

Please notify me so soon as the committee shall have taken action regarding the acceptance of the recommendation made above, so that no time may be lost.

Very respectfully,

E. W. HILGARD,
Director of Experiment Stations.

From communications since received from the Secretary of the Pomona Board of Trade, Mr. J. D. H. Browne, it appears that all is progressing favorably, and the contracts for the building will soon be let and construction begun.

While believing that the location chosen is, all things considered, as good as could have been found for the purposes of the general culture station, yet I also consider that the specialty of citrus culture, like that of viticulture, demands a more detailed consideration in some locality which, like Riverside, appears to combine the highest advantages for its pursuit. The suggestion that, while we are unable to defray the cost of a special station from the regular fund, we might nevertheless give to such station, if established under private or other auspices, the same attention now given to the special viticultural stations, seems pertinent; and so far as my personal views and action can govern herein, I should be greatly pleased to see such a station set on foot by the public spirited citizens of Riverside.

THE SPECIAL VITICULTURAL STATIONS

Under private auspices, respectively, at Cupertino, Santa Clara County, Mission San José, Alameda County, and Fresno, have continued to supply important materials and data, which have been utilized in the work at Berkeley, and will be fully set forth when it shall be possible to complete their elaboration and put them in print, as I hope will be the case before the end of the present year. That it is the multifarious and exacting work involved in the establishment of the new stations that has thus far prevented the publication of these results, I have before stated. It is only now that, with the combined assistance of Messrs. Paparelli, Colby, and Bioletti, the accumulated materials can be put in order and systematized for intelligent and comprehensive discussion. It is needless to say that as the new general stations (in each of which a large collection of vines has been planted) shall send in their crops, the results will be much more fruitful and generally interesting; and hereafter, there will be no undue delay in their publication.

It must be added that, by the courtesy of the governing Board of the State Institution for Feeble-Minded Children, located near Glen Ellen, Sonoma County, a plot of about an acre of phylloxera-infested vines has been set apart for experimentation under our charge, in a region where the existence of such a plot cannot possibly excite any animadversion. The arrangement was made too late in this season to inaugurate the work, but it is intended to plant next season a full assortment of resistant stocks, with a view to testing the best modes of renewing the vineyards in that region, and to continue the observations heretofore made at Berkeley. The infested plot at the latter place having thus become superfluous, it has been thought best to eradicate it completely. Curiously enough, an elaborate examination made of the several other vine plantations on the Berkeley grounds, one of which was situated directly under the wind and within three hundred yards from the infested plot, but screened from it by thickets of trees, has shown their complete exemption from the pest; thus proving the causelessness of the opposition to the existence of the plot that has from time to time been set on foot for special purposes.

It would be idle to pretend that the stations at present established, even taking into account the four viticultural stations, represent properly more than a fraction of the State. The Sacramento Valley, with the widely different lands on opposite sides of the river, and the northern portion of the Coast Range, inland from or northward of Cape Mendocino, constitute distinct climatic regions of equal extent and dignity with those already provided for, and are omitted only for want of means, and of "push" on the part of the populations concerned. So far as can now be foreseen, these stations, and others of a more special character—say, for instance, a "citrus" station at Riverside—can now be provided for only by special action, legislative or local.

Respectfully submitted.

E. W. HILGARD,
Professor of Agriculture and Agricultural Chemistry, and Director of Agricultural Experiment Stations.

FINANCIAL STATEMENT REGARDING EXPENDITURE OF EXPERIMENT STATION FUND FOR THE YEAR ENDING JUNE 30, 1890.

Agricultural Experiment Stations of the University of California in Account with the United States Appropriation.

		Cr.	Dr.
1890.	To receipts from the Treasurer of the United States as per appropriation for year ending June 30, 1890, under Act of Congress approved March 2, 1887		$15,000 00
June 30—	By buildings	$617 57	
	By chemical apparatus and supplies	504 96	
	By furniture	171 86	
	By fencing and drainage	169 94	
	By freight and expressage	340 31	
	By incidental expenses	328 01	
	By labor	4,256 24	
	By postage and stationery	269 95	
	By printing	156 75	
	By salaries	4,719 96	
	By supplies	1,770 22	
	By scientific instruments	334 75	
	By tools, implements, and machinery	216 45	
	By traveling	420 58	
	By water supply	722 45	
			$15,000 00

We, the undersigned, duly appointed members of the Finance Committee of the University of California, do hereby certify that we have examined the books and accounts of the Experiment Stations of the University of California for the fiscal year ending June 30, 1890; that we have found the same well and correctly kept and classified as above, and that the receipts for the time named are shown to have been $15,000, and the corresponding disbursements $15,000; for all of which proper vouchers are on file, and have been by us examined and found correct.

A. S. HALLIDIE,
ALBERT MILLER,
Finance Committee of the Board of Regents, University of California.

I hereby certify that the foregoing statement to which this is attached is a true copy from the books of account of the institution named.

JOHN J. HERR,
Auditor.

MISCELLANEOUS REPORTS.

Military Science.

To the President of the University of California:

Sir: In answer to your request of September 10, 1890, regarding the progress, condition, and wants of the Military Department of the University, I have the honor to submit the following:

The progress made in this department during the past two years has been most gratifying. An inspection has been made once each year, under the orders of the War Department, by an officer of the Inspector-General's Department, with a view to discovering the progress and condition of the work. The said officer's report to the War Department has, in each instance, been most flattering. The discipline has been excellent. The general disposition of the student body to comply with all military exactions cannot be too highly commended. Cheerful respect of authority, prompt obedience of orders, earnest effort to attain technical proficiency, gentlemanly and manly deportment have signalized the student body on all occasions while on military duty. Not an instance calling for the exercise of specific military discipline has occurred. The improvement in the set-up, carriage, and physique of the students is markedly noticeable. Too much credit cannot be given the excellent work done in the Department of Physical Culture, which coöperates admirably with that of the Military Department, and is producing results of which the University may well be proud.

The Government, after considerable solicitation, consented to make an exception in favor of the University in the matter of the allowance of arms and equipments. The Army Regulations limit the issue to one hundred and fifty. The University has been allowed one hundred extra arms and equipments. The allowance of ball cartridges, for target practice, had until the past year been limited to one thousand rounds. On urgent representation of the department's needs, the allowance of ammunition was increased in the past year to eight thousand five hundred rounds. A long felt want of the department—a suitable place for cadet officers to meet, and for students to don their uniforms—has, in a measure, just been supplied by the fitting up of a room in the basement of North Hall.

The great need of the department, one that cannot be too urgently called to the attention of the Board of Regents, is a building, separate and apart from the other buildings, for use as an armory. Such a building could be made to meet many desirable ends, aside from its strictly military uses. It could be admirably adapted to use as a lecture hall, a hall for commencement exercises, alumni meetings, receptions, celebrations, etc. There is at present at Berkeley no building suitable to these purposes. Moreover, a portion of it could be set aside for the exclusive use of the students, such as study-rooms, lunch-rooms, recreation-rooms, etc. The students are sadly neglected in regard to such accommodations.

Aside from its great utility, an armory building could be made, because of its distinctive character, a most picturesque addition to the grounds. A distinctively military style of architecture, with its towers, turrets, and crenelated lines, would be a pleasing contrast to that which prevails at Berkeley.

The exigencies of the service have necessitated my removal from the University of California to other fields. The Secretary of War has directed that I be relieved by Lieut. B. H. Randolph, Third United States Artillery, on September 23, 1890. I wish to avail myself of this opportunity to express my warm appreciation of the uniform courtesy and consideration which I have received at the hands of the President, Faculty, and students.

Respectfully submitted.

GEO. F. E. HARRISON,
First Lieutenant, Second United States Artillery, Professor of Military Science and Tactics.

Physical Culture.

To the President of the University of California:

Sir: The systematic work in physical culture, pursued for the past eighteen months at the Harmon Gymnasium, has been exceedingly successful, and productive of much good to the students. All who have come under its thorough work have been benefited, but the greater improvement is noticed in those assigned to special work for the correction of deformities, and the building up of deficient parts. This is one of the few universities where physically deficient men are required to do *special work* under *special* instruction. We note, not alone physical improvement, but increased mental activity.

The aims of the department are all in the direction of body building and health preserving; the correcting of deformities and the building up of scantily developed parts; restraining the over-ambitious, restricting the amount and kind of exercise, and directing superfluous energy aright, as well as teaching students to take better care of their health in matters pertaining to their every day life: as diet, clothing, baths, ventilation, and kindred subjects. Besides which, personal and medical advice is given to the students, free, at the office of the Director in the Gymnasium Building.

All male students, during their first two years, are required to take physical exercise five half hours each week. At the beginning of the year they undergo a thorough physical examination and measurement, in accordance with the Sargent system. They are then assigned to special or general class work.

The prescriptions of the Director are carefully carried out by the Assistant in Physical Culture, Mr. Walter Magee, who is a thoroughly reliable and competent instructor. No one is allowed to exercise except under his direction and guidance.

In cases of heart disease, weak heart, weak lungs, rupture, etc., restriction becomes necessary, and such students are debarred from violent sports and excessive exercises. Certificates of disability are granted, in proper cases, as ground of excuse from military drill. All who take part in athletic contests must undergo a physical examination before going into training, and just previous to such contests. Those assigned to special work have frequent physical examinations. These precautions save many from injury.

Thus is the work carried on, in a thoroughly systematic manner, with special reference to the needs of each individual case.

The predominance of weak lungs and contracted chests has been particularly noticeable in the examinations made. The improvement among these, in capacity and strength of lungs, has been very great under the use of developing appliances.

The examination and treatment of the eyes form an important part of the work of Physical Culture.

Dr. W. F. Southard, a skillful and well known oculist, has given his services, the past term, at the Gymnasium office, in examining eyes, and giving advice regarding the care of the eyes, use of glasses, etc. He has examined eighty-three students, of whom forty-four, or more than fifty per cent, were found to have imperfect vision in a greater or less degree. By his timely advice many have been benefited.

The following reasons are advanced to show the necessity of examining the eyes of all students:

1. To obtain statistics in regard to errors of vision; their development and increase during student life, etc. Many leading colleges and universities have systematic examinations made, and they are firmly established as of recognized utility.

2. To discover any possible error in vision at the earliest point in the academic course; to correct same and prevent increase of the trouble. Examinations of the eyes for the correction of visual errors is as important as is any other part of the physical examinations of students for the correction of physical defects.

3. The fact that visual errors originate and increase during student life, as shown by statistics already gathered, would indicate the necessity of examination, at least once a year, of *all* students, and of defective ones every six months.

4. Defects of vision influence health, and unless early corrected, tend to seriously impair health.

5. School life originates myopia. It progresses with the progress of the pupil in his studies (especially in the higher branches). This can only be corrected by glasses, which need to be changed, in some instances, once or twice a year. They should be examined every six months. Those who are in a high degree myopic should have the character of their exercise regulated, and violent exercise prohibited.

6. In hypermetropia, it is important to prevent development of spasm of the muscles of accommodation, and permanent weakness of these muscles, and to prevent weakness of recti muscles. Hypermetropia also develops, in time, diseases of the retina and optic nerve, unless prevented. Hypermetropics must have glasses, and be regulated in their time of application for near work.

7. Astigmatism should be corrected at the earliest possible moment, on account of its being a spherical aberration, causing the muscle of accommodation to be constantly used to form a perfect image on the retina. The most common symptom is headache. All persons with persistent headache should have the eyes examined.

Miss M. E. Bennett, M.D., has given her services the past year in examining the young lady students who desired to take Physical Culture, and has performed that duty in a highly satisfactory manner.

There is a growing demand for competent teachers of Physical Culture. There is no reason why the University of California should not send forth teachers prepared to do the work as it is done here. The time has come when the department should be put upon a more advanced footing, its importance recognized, and its proper place accorded it. The scope of the Department of Physical Culture should be at once enlarged to meet the demands. Courses of lectures on the elements of anatomy, physiology, and personal hygiene; physical diagnosis; mode of prescribing exercise; massage; treatment in emergencies, etc., should be established.

A competent lecturer on elocution, and the care of the voice and throat, would be a valuable addition to the *personnel* of the department.

We should be able to thoroughly prepare teachers of Physical Culture and Gymnastics to supply a demand already existing, and students would go out better prepared to meet the emergencies of their life work.

Respectfully submitted.

FRANK HOWARD PAYNE, M.D.,
Director of Physical Culture.

LIBRARY AND ART COLLECTION.

To the President of the University of California:

SIR: I submit a brief statement of the progress of the University Library during the two years ending June 30, 1890:

GROWTH.

The number of volumes added during this period is smaller than that of any two years in the last decade:

(*a*) By purchase	2,087 volumes.
(*b*) By binding of periodicals	672 volumes.
(*c*) By gift	1,360 volumes.
Total	4,119 volumes.
Total in the Library	41,518 volumes.

It is with earnest solicitude that the members of the Faculties at Berkeley look forward to the time when these tools of instruction shall be furnished more abundantly, and in a number more nearly commensurate to our needs.

ATTENDANCE.

In so far, however, as relates to the use of the literary treasures already garnered within the walls of the Bacon Building, we may feel gratified.

Term average, 1889, 340 students	45.3
Term average, 1890, 380 students	60.7

The all-day average of student-readers has increased in one year 33 per cent. This is undoubtedly due in large measure to a change in the subject-matter of instruction for Juniors and Seniors in the College of Letters, which necessitates more work in the Library; but not entirely, for an increase of readers of scientific books is quite perceptible, and the popular courses in History and Politics and in Philosophy contributed not a little to raise the average.

In a university library activity is far from being wholly dependent on the number of new books continuously added. The "last novel" is seldom or never inquired for; the inquiry is rather: "What books or references have you got on this or that subject?" Yet, while our shelves now are so well stored with books that we seldom are unable to afford some satisfactory information to an inquirer on any topic, still every thorough student soon runs up against the wall and his further progress is barred for lack of books—such books as are the common possession of all libraries (that have any pretensions as being such) except our own. Unhappy the scholar when the latest biography of Browning, the completest work on bridge building, or the most recent, and perhaps most erudite critique of Plato, is not within reach. This state of affairs, *i. e.*, the lack of *new* books, is wholly due to insufficiency of money for book purchases. Three thousand dollars for books is a mere bagatelle when compared with the sum required to furnish a university library with its widely diversified and far reaching lines of research. But this sum must be economically expended, and so, instead of *monthly* shipments of books, old as well as new, from the various book centers of Europe and America, we must be content with annual orders, lest the transportation charges on otherwise delivered consignments bear too great a proportion to the entire disbursements.

On one particular line this Library is advancing constantly, namely: in collecting (by exchange, or at cost of postage, or at no cost whatever) and preserving the vast variety of pamphlet literature as published by municipal officers, governmental boards, scientific societies, European universities, and private individuals. Ephemeral and apparently useless many of them are, and wearisome and arduous the task of properly classifying and cataloguing them, but future generations of students will not be thankless. Similar volumes of bound pamphlets, gathered by various individuals, have found their way to our shelves, and constitute a not invaluable part of our treasures. In one may be a collection of seventeenth century sermons on episcopacy; in another, rare tracts on the Unitarian controversy; in a third, contemporary brochures on the corn law struggle, or the habeas corpus act, etc. One volume, gathered and bound by the late Hon. Sherman Day, contains, among other interesting pamphlets, "The Echo," printed at the Porcupine Press, by Pasquin Petronius (an anonymous illustrated series of poems by Dwight, Alsop, and Hopkins, 1807); "Letters of Jonathan Old Style, Gent," N. Y., 1824 (by Washington Irving); and Joel Barlow's "Letter to the National Convention of France on the defects in the Constitution of 1791," and his poem, "The Conspiracy of Kings." By persistent effort, extending over several years, this Library has secured what is probably the best extant collection of pamphlets relative to the contemporary "boom" in California. In 1888–90 five thousand six hundred and sixteen pamphlets have been given to this Library.

The various donations to the Library are fully enumerated in the annual reports of the Secretary of the University.

PUBLICATIONS.

Professors C. M. Gayley and F. N. Scott (of Michigan) have prepared "A Guide to the Literature of Æsthetics," issued as Library Bulletin No. 11.

The Contents-Index of this Library has been printed in a handy octavo volume of five hundred and nineteen pages, and has proved of great assistance.

ART GALLERY.

During 1888–90 the adult visitors to the Art Gallery numbered five thousand nine hundred and ninety-three persons; since the opening in 1882 the total number of visitors has been thirty thousand six hundred and forty-seven.

For several years no additions have been made to our collection of paintings. It is hoped that steps will be taken to induce every California artist of note to present to the University at least one specimen of the work of his brush. Thus the gallery would become truly representative of local art, and would attract visitors, a large proportion of whom are tourists from the East and from Europe, by thousands. As a financial venture we believe the result to the *artists themselves* would prove very profitable.

Respectfully submitted.

J. C. ROWELL,
Librarian.

MUSEUM.

To the President of the University of California:

SIR: In answer to the tenor of your circular, I beg to inform you that during the past two years much work has been done in the Department of the Museum in identifying and classifying, but more particularly among the insects, mollusks, and reptiles. The standing want is a new museum. But the pressing want and great desideratum is a heating apparatus. Since the steam generator was put out of use the Museum has not been available during the winter months.

Respectfully submitted.

J. J. RIVERS,
Curator of the University Museum.

LICK ASTRONOMICAL DEPARTMENT.

To the President of the University of California:

SIR: I have the honor to submit to you my third annual report as Director of the Lick Observatory.

The Observatory was transferred to the Regents of the University by the Lick Trustees on June 1, 1888. Its history previous to that time is well known and it may be found in various publications, notably in Volume I. of the *Publications of the Lick Observatory*; and, in a more popular form in the *Hand-book of the Lick Observatory* (1888).

The official history of the Observatory since its transfer is given in the two annual reports referred to. Extracts from one of these were printed in the Report of the President of the University for 1888 (p. 98). The other remains in manuscript.

Since July 27, 1889, the Astronomical Society of the Pacific has regularly devoted a portion of its publications to "*Notices from the Lick Observatory*," which are short accounts of the work and affairs of the institution prepared by members of the staff. More than eighty pages of such "Notices" have already appeared, and in these pages the history and progress of the Observatory can be traced from month to month.

The Observatory was declared to be "complete" on its transfer to the Regents in June, 1888, with the exception of certain small items, to provide which the sum of $1,198 had been set aside by the Lick Trustees. As it was well known to me that the institution was very far from complete at that time, it became my duty to set forth the pressing wants of the establishment and to ask their consideration by the Regents, and specially by the Committee on the Lick Observatory. The matters referred to have been carefully considered by that committee, and expenditures from the principal of the Lick Fund have been made when necessary. The total amount of these expenditures up to date is over $15,000; and a few more items still remain to be provided for. The Endowment Fund of the Lick Observatory will thus be reduced to about $95,000. The interest on this sum is not sufficient for its support, and the deficiency is met out of the General Fund of the University, as provided for by the resolution of the Regents adopted June 10, 1887.

PERSONNEL OF THE OBSERVATORY.

The organization of the institution is at the present time:

HORACE DAVIS	President of the University.

EDWARD S. HOLDEN	Director and Astronomer.
SHERBURNE W. BURNHAM	Astronomer.
JOHN M. SCHAEBERLE	Astronomer.
JAMES E. KEELER	Astronomer.
EDWARD E. BARNARD	Astronomer.
AUGUSTUS J. BURNHAM	Secretary.

John McDonald	Machinist.
Rod P. Fraser	Carpenter.
H. K. Curtis	Janitor.
Joseph Roban	Laborer.

DUTIES OF THE OFFICERS.

The duties of the various astronomers and workmen were defined by written instructions in June, 1888, and they have not been changed since then, but remain as recited in my previous reports.

STUDENTS.

Mr. Leuschner, candidate for the degree of Ph.D., has continued his studies here with marked diligence and success. He has been appointed Instructor of Mathematics in the University, which appointment may somewhat interfere with his course; although he may, on the other hand, be able to complete his thesis (about all that remains of his required work) in time.

Mr. Downs, candidate for Ph.D., is on leave of absence granted by the Academic Council.

Mr. W. W. Campbell, Instructor of Astronomy, University of Michigan, has spent his summer here as a special student in practice with the photographic and spectroscopic instruments. He has virtually served us as an additional skilled assistant in both these subjects, and has also made, on his own account, a very valuable series of observations to determine the coefficient of photographic atmospheric absorption according to a programme prepared by me.

The students of the University of California, under the direction of Professor Soulé, have made observations to determine the difference of longitude between the Students' Observatory, Berkeley, and Mount Hamilton. The observations at this end of the line were made by Mr. Keeler.

The students of the University of California and of various California colleges have been invited to visit the Lick Observatory on special evenings set apart for them. During 1888, 1889, and 1890, public lectures have been given at various places in California by Messrs. Keeler, Barnard, Hill, and myself.

VISITORS.

The regulations for visitors, approved by the Committee on the Lick Observatory, remain as always:

HOURS FOR VISITORS TO THE LICK OBSERVATORY.

The Observatory buildings will be open to visitors during office hours, every day in the year. Upon their arrival, visitors will please go at once to the Visitors' Room and register their names.

An hour or so can be profitably occupied in viewing the various instruments, and the rest of the stay can be well spent in walks to the various reservoirs, from which magnificent views of the surrounding country can be had. At least an hour and a half of daylight should be allowed for the drive from the Summit to Smith Creek. There are no hotel accommodations at the Summit.

Admission of Visitors at Night.

For the present, visitors will be received at the Observatory to look through the great telescope every Saturday night, between the hours of seven and ten, and at these times only.

Whenever the work of the Observatory will allow, other telescopes will also be put at the disposition of visitors on Saturdays, between the same hours (only).

At 10 P. M. the Observatory will be closed to visitors, who should provide for their own conveyance to Smith Creek, as there is no way of lodging them on the mountain.

It is expected by setting apart these times for visitors (which allow freer access to the Lick Observatory than is allowed to any other observatory in the world) that all interested may be able to arrange their visits in conformity to them; and that the remaining hours of the week will be kept entirely uninterrupted, in order that the astronomers may do the work upon which the reputation and the good name of the Observatory entirely depend.

Our visitor's books show six thousand four hundred visitors from June 1, 1888, to June 1, 1889; five thousand one hundred and thirty-two visitors from June 1, 1889, to June 1, 1890.

ACCOMMODATION FOR VISITORS TO THE OBSERVATORY.

In order to accommodate visitors to the Observatory on the public evenings, a continuous bench, long enough to seat one hundred persons, has been built on the east, south, and west sides of the upper gallery of the large dome. As we sometimes have as many as two hundred and fifty visitors to the Observatory during one of our public nights, this addition has become necessary.

The Gundlach Optical Co., of Rochester, N. Y., has made a low power eye-piece with a large field—something like half a degree—for the use of visitors who come to see the moon. Such an eye-piece will show enough of the lunar surface to make a *picture* with a background of sky, which is what is really needed to convey the effect. The eye-pieces used in the regular astronomical observations have fields of view of hardly more than 10′ of arc, and, hence, only serve to show a limited portion of the moon's surface—less than one tenth, usually. As the image of the moon in the large telescope is 6.51 inches in diameter, it follows that the field lens of the new eye-piece must be of about the same dimensions. It will be useful in real work also, for objects like nebulæ and comets, where a large field and full contrast are required.

HAND-BOOK OF THE LICK OBSERVATORY.

I employed a part of my leisure time between my resignation as President of the University and my appointment as Director of the Observatory, in writing a hand-book for visitors to Mount Hamilton. This has proved a very desirable aid for intelligent visitors, and has helped to make the Observatory more useful and more popular.

ASTRONOMICAL SOCIETY OF THE PACIFIC.

In February, 1889, an Astronomical Society of the Pacific was formed by forty residents of San Francisco and Mount Hamilton. This society has grown and flourished in a remarkable and gratifying manner. It now has two hundred and seventy-five members scattered all over the world, and regularly prints a journal, which has taken high rank among others of its class. I am convinced that one of the objects of the Lick Observatory—namely, the diffusion of knowledge—is powerfully advanced through the meetings and publications of this society.

THE TOMB OF JAMES LICK.

Plans looking to the improvement of the surroundings of the tomb of the founder of the Observatory are under consideration by the Regents, and an adequate appropriation has been made for the purpose.

THE INSTRUMENTS OF THE LICK OBSERVATORY.

The 36-inch Equatorial.

This instrument is in perfect order and gives more and more satisfaction. The visual objective has been thoroughly tested in various ways.

The following extract from a paper by Mr. Keeler summarizes the opinions of the astronomers of the Lick Observatory upon the performance of the great telescope, and may be of general interest:

* * * As the large telescope has now been sufficiently long in use for a thorough test of its various qualities, it may be worth while to give a brief summary of the different kinds of work in which it has proved to be effective.

Separation and Measurement of Close Double Stars, as attested by the long list of new doubles, and micrometer measurements of these and of difficult pairs already known, published by Mr. Burnham.*

Detection of Very Faint Stars.—Professor Holden and Mr. Schaeberle have observed six stars within the dark interior space of the ring nebula in Lyra, besides the central one (No. 14 of Lassell's drawing), and five more within the nebulosity,† and of all these, only the central one was previously known. An example of a double star with extremely minute components, discovered with this telescope, is the pair preceding the trapezium in the nebula of Orion.‡ It was found by Mr. Barnard; and Mr. Burnham, who measured it, considers it the most difficult pair with which he is acquainted in the whole heavens.

In this connection may also be mentioned the observations of the satellites of Mars,§ made here during the opposition of 1888. When Mars was in opposition the satellites were easy objects, being plainly visible without the aid of an occulting bar to hide the planet, and they were seen as late as July eighteenth, when their brightness was only 0.12 of that at the time of their discovery in 1877.

Observations of the Structure of Nebulæ.—The Lyra nebula has already been mentioned under the preceding division, but only in relation to the minute stars which appear in it. The structure of the nebula itself was better seen by Professor Holden with this instrument than with any other that he had used. He says: "One's first idea is not so much that the aspect is unfamiliar as that it is distinctly different; that its simple structure has suddenly become complex; and, finally, that the task of depicting it completely is practically impossible by the ordinary methods."‖ The observations which show the probable existence of helical forms in the nebulæ¶ should also be mentioned.

Observations of Comets.—The companions of Brooks' comet have been observed and measured during the past few months by Mr. Barnard, who finds a considerable advantage in the 36-inch over the 12-inch refractor.** With the latter instrument the faint companions, called by Mr. Barnard *D* and *E*, were at all times invisible, although for blackness of field and excellence of definition the 12-inch telescope is unsurpassed. They have not been seen elsewhere.

Definition of the Surface Features of a Planet.—The views of Jupiter obtained here during the past opposition have sufficiently proved to all the observers that the large telescope is as suitable for the observation of planetary details as for the other classes of work above given. The extremely fine division discovered by the writer, in the outer ring of Saturn, outside of the Encke shading,†† has been seen by all the observers here on numerous occasions, but, so far as I am aware, it has been seen at no other place. Finally, I may refer to observations by Professor Holden, not yet published, on details seen in specially interesting parts of the lunar surface.

These different classes of astronomical work essentially cover the field of visual observation, and in all the 36-inch refractor has shown its capability of yielding the best results.

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* *Astronomische Nachrichten* (Nos. 2,929 and 2,930).

† *Monthly Notices*, R. A. S. (Vol. XLVIII., page 383).

‡ *Monthly Notices*, R. A. S. (Vol. XLIX., No. 6).

§ *Astronomical Journal* (No. 178).

‖ *Monthly Notices*, R. A. S. (Vol. XLVIII., p. 385).

¶ *Publications*, A. S. P., No. 3.

** *Astronomische Nachrichten* (No. 2,919).

†† *Astronomical Journal* (No. 190).

The mounting of the telescope has always been sufficiently stable for micrometric measures. It was found to be deficient in stability for long photographic exposures, and it was contemplated to fill the pier with sand, etc., to give it more stability. The new photographic slide-rest, which carries the negative plate, has entirely obviated the necessity for this, however.

A negative taken by me for the purpose, shows just what the failures of the pier, etc., are, and how they have been obviated by the new apparatus, as follows: I exposed a plate for twenty minutes on a group of stars during a windy night, and the images of the stars show all the defects due to instability of the pier and flexures of the tube and axes, etc. I also exposed the same plate to the same group for the same time on the same night, using the new guiding eye-piece, etc., to counteract the hindrances named. Thus this plate shows two images of each star of the group side by side. One image represents the original state of things; the other the result of the improvements which have been introduced. A comparison of the two images shows conclusively that the original state of the pier, etc., was not satisfactory, and also that the defects have been cured. I am engaged in a study of the photographic objective, which has never been thoroughly tested up to this time, and shall be able to report upon it shortly. I can now say that it is not perfect, and that I believe it can be improved by the maker.

It is probable that slight changes in the mountings of the finders may prove to be a great advantage to the observers.

Some method of quickly winding the clock weight should be provided.*

The spectroscopic apparatus, which was originally very satisfactory, has been improved in several important respects by changes suggested by Mr. Keeler. In the future it will be necessary to provide a powerful solar spectroscope, which is not needed at present, simply because we have no observer who can be spared for such observations. Important as they are, we are obliged to neglect them.

New Instruments for the Lick Observatory.

The Board of Directors of the Bache Fund of the National Academy of Sciences has loaned to the Lick Observatory a spectroscope specially designed for the observation of faint objects, as the aurora and the zodiacal light. It will be used here to examine the spectrum of the latter object.

The Trustees of the Thompson Fund of the American Association for the Advancement of Science have made a grant of money for the construction of a small spectroscope to be used in connection with the great telescope in the observation of variable stars. The thanks of the Observatory are returned for these material additions to our spectroscopic equipment.

Hon. C. F. Crocker has authorized the construction of an equatorial stand to take the Willard photographic telescope bought by him for the observation of the eclipse of December, 1889. The mounting will be made by Mr. Brashear, and will be provided with a driving-clock, controlled in the manner invented by Mr. Keeler. The Willard lens, together with a 5½-inch Dallmeyer camera (lent to us by Mr. Pierson), will be mounted side by side, for the present, and will be employed by Mr. Barnard in making photographs of the Milky Way.

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* This was done in February, 1891.

The large periscopic eye-piece made by the Gundlach Optical Company has been received. Its glasses are made from the new Jena material. The field-lens is of crown, and is six inches in diameter. The rays from this pass through a triple eye-lens, three inches in aperture. The whole length of the eye-piece is ten inches, and it weighs about thirteen pounds. The field of view is over 30′. The equivalent focal distance is five inches, and, therefore, its magnifying power on the great telescope (focus 694.4 inches) is about one hundred and forty diameters. It will not utilize the whole area of the objective, consequently. It gives admirable views of the larger nebulæ, the Moon, etc., as the field is flat and the color-correction is excellent.

A self-registering thermometer, made by Richard Frères of Paris, has been purchased for trial. The instrument runs a week at one winding, and appears to be very satisfactory. Its cost is but 135 francs in Paris.

An improvement to an old instrument is often more important than the addition of a totally new one. Through the kindness of Professor T. C. Mendenhall, Chief of the United States Coast and Geodetic Survey, a very important addition has been made to the measuring engine of the Lick Observatory by the determination of the errors of its glass scale A. This scale has three hundred divisions, about 0.02 inches apart. Mr. O. H. Tittman, together with Messrs. Parsons and Fischer of the Survey, have investigated this scale, and have determined the errors of each one of the three hundred divisions to the nearest 0.00001 inch. The scale thus becomes available for the examination of micrometer screws, etc., and particularly for the measures of stellar photographs taken with the large telescope where $1' = 0.1658$ inches, $1'' = 0.00276$ inches, etc. In order that the benefit of this work of the Coast Survey shall be as widely spread as possible, the Lick Observatory offers to determine the errors of scales not longer than four or five inches belonging to institutions in California, provided such scales are to be used for strictly scientific purposes.

Electric Lighting for the Great Telescope and the Meridian Circle.

It was contemplated by the Lick Trustees to provide an electric light plant for the great telescope, but the Observatory was transferred before this was done.

The Edison Manufacturing Company, of Orange, New Jersey, has offered (through A. E. Kennelly, Esq.) to make such a plant and to present it to the Observatory free of cost. I understand that this generous offer will be accepted by the Regents at their next meeting.*

Double-Image Micrometer.

One of the most important researches in astronomy is the accurate determination of the diameters of the major planets, and of their ellipticity, etc. The work should be done by means of a double-image micrometer, which remains to be added to our equipment. I am in correspondence with the leading makers on this question, and hope soon to submit an estimate for such an instrument.

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* Most of the plant is now (March, 1891) at the Lick Observatory, but it cannot be installed until a suitable shed is built to protect it from the weather.

Other Instruments.

I have nothing to add to what is contained in my previous reports regarding the other instruments of the Observatory, which are all in good condition, and which are all in use.

THE BUILDINGS OF THE LICK OBSERVATORY.

The great dome has been subjected to the severest sort of a test by the storms of the winter of 1889–90, and it has stood this test magnificently. It is now in as good condition as when it was erected, and this simple statement is the highest praise which can be given to it.

The moving floor continues to work well, although there are various changes in its design and construction which could be made, were a second example to be constructed.

The winter of 1889–90 showed us that various changes were required in the main building to make it water tight, etc. New rain gutters have been built to the north half of the building. Those on the south half have been repaired, but they must be replaced by new ones, properly built, by and by.

The outside of the brick walls has been scraped, and they will be oiled and painted later. The inside plaster walls are still to be scraped and kalsomined to remove the water stains, etc. It would be an economy in the end if these walls were well painted now.

DWELLING HOUSES.

All are in fair order. The outside walls of the brick dwellings should be painted in 1891.

The interiors of some of the rooms in the brick houses, and of the whole of Mr. Barnard's cottage, have been painted during the present year.

The outside surfaces of all three domes have been painted white (two coats) and are in good condition. The Meridian Circle and Transit Houses are also in good condition, but must be painted in 1891.

Every roof on the reservation has received one coat of metallic paint during the spring and summer.

The east side of the barn has been painted during the year.

WATER SUPPLY.

The water supply remains as before. It is fully described in the Secretary's Report, 1889, page 130. It requires some important but not expensive improvements.*

FIRE DEPARTMENT.

This remains as before, except that a new hydrant and one hundred feet of hose have been placed in the attic of the main building. It receives attention weekly.

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* These were ordered by the Regents in February, 1891.

PHOTOGRAPHIC DARK-ROOM.

A new dark-room has been built in the cellar of the Meridian Circle House, so as to insure the even temperature necessary in the development of our plates.

RAINFALL ON MOUNT HAMILTON.

Meteorological observations have been kept at Mount Hamilton since 1880. The following table of rainfall on the Summit is the best available summary. This rainfall is considerably more than that in the Santa Clara Valley near San José (about 13.4 inches), and it is probably considerably less than the fall in some of the cañons and valleys immediately surrounding the mountain. The great variations in the annual amount of rainfall are interesting from a meteorological point of view, and decidedly inconvenient from a practical one, especially as our reservoir capacity is not quite adequate.

Rainfall at Mount Hamilton in the Years 1880–90.

Month.	1880–81	1881–82	1882–83	1883–84	1884–85	1885–86	1886–87	1887–88	1888–89	1889–90
	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
July	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00
August	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.00	0.02	0.00
September	0.00	0.10	0.00	0.65	0.65	0.15	0.00	0.33	0.49	0.00
October	0.00	0.33	6.16	2.15	3.71	0.05	0.60	0.09	0.03	4.38
November*	0.50	0.91	3.45	1.48	0.01	-------	2.82	0.90	3.27	4.69
December	9.68	9.72	1.93	2.05	33.84	-------	2.34	11.25	4.23	13.19
January	3.51	3.55	3.10	5.60	1.99	-------	2.83	10.04	1.04	7.93
February	5.99	2.90	3.75	12.76	0.57	1.80	7.80	1.38	1.42	0.00
March	1.13	5.40	8.66	16.35	1.15	5.77	1.39	3.40	6.17	4.39
April	0.98	4.70	2.66	11.96	2.08	6.79	5.75	0.68	1.92	1.79
May	0.09	0.48	7.55	1.24	0.16	0.70	0.25	1.25	3.21	0.00
June	0.33	1.06	0.00	3.85	0.36	0.00	0.30	0.67	0.00	0.00
Sums	22.21	29.15	37.26	58.09	44.67	-------	24.08	30.03	21.80	36.37

* November, 1880--One shower, amount assumed to be 0.50 of an inch. N. B.—December, 1884.

Mean annual rainfall (9 years), July to July =33.74 inches.

RETAINING WALLS.

The Regents have authorized the construction of retaining and other walls, and this work has been begun and is progressing slowly. Much more work of this nature will eventually be required.

FENCING THE RESERVATION.

I beg to repeat my recommendation that the present Legislature be asked for an appropriation of $2,700 to fence our whole reservation. This work is needed on many accounts. Various bands of cattle are loose on the Observatory land, and have interfered seriously with our water supply, etc. Some of our land is fenced in by our neighbors, etc. The neighborhood is being rapidly settled up, and wood will be cut from our land unless it is properly fenced, etc.

BARN.

The present situation of the barn and corral is not a good one. In a few years a new barn will be required, and in my opinion it should be built at the camp ground.

At the same time a workman's cottage should be built there.

WOODSHED AT THE SPRINGS (AQUARIUS).

A woodshed about thirty-two by eight feet is required at the springs to keep the fuel for the pumping engine dry.

WOODSHED AND STORE HOUSE AT THE SUMMIT.

It is necessary to build a woodshed and store house on the summit level, in order to keep the fuel dry and in order to protect the tools, spare lumber, electric lighting plant, etc., from the weather.

TELEGRAPH AND TELEPHONE LINE.

The line to San José is in fair condition from the Summit to Smith Creek, and for a small distance near San José. The rest of the line is wretchedly out of order, and the first storms of the winter will prostrate it.

This line is not only necessary in the scientific and business operations of the Lick Observatory, but upon its maintenance the comfort of the whole colony depends. It may be that the health, or even the life of some one of us will depend on whether or not a surgeon can be quickly summoned from San José. We have already had one severe accident here (fracture of the skull and concussion of the brain of one of the workmen—Roban), and there is every reason why we should be prepared for such emergencies at all times. It appears to be a responsibility which must be accepted, and which cannot be escaped.*

LIBRARY.

The library has been put in good condition by the appropriation for binding books, which was granted during the last year. We still lack very many important works, which must be supplied by purchase, if at all. All our correspondents contribute their current works generously, and our sincere thanks are due to them, and to the Smithsonian Institution, which transmits our foreign exchanges from Washington free of charge.

Hardly any gift could be more immediately useful than an endowment fund for the library of the Observatory.

Our library is far from complete, as may be seen from the following figures:

The Lick Observatory Library contains about two thousand bound volumes, and about three thousand five hundred unbound pamphlets.

The library of the Pulkowa Observatory contains about thirteen thousand five hundred bound volumes, and about fifteen thousand five hundred unbound pamphlets.

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* Work on the line is now (March, 1891) in progress.

The need for a complete library is far greater at Mount Hamilton than at Pulkowa, which is only a few miles from the magnificent collections of St. Petersburg.

Dr. George F. Becker, of the U. S. Geological Survey, has done the Observatory a great service by depositing in its library the following volumes from his private collections:

CRELLE: *Journal für die reine und angewandte Mathematik;* Vols. 1 (1826) to 15, inclusive; parts of 16 and 18; Vols. 20 to 68, inclusive. [The Observatory set begins with Vol. 100.]

GILBERT: *Annalen der Physik;* complete, 1799–1824; Vols. 1 to 76, inclusive, with index.

THOMSON & TAIT: *Handbuch der Theoretischen Physik;* Vol. 1; two parts.

LAGRANGE: *Oeuvres de Lagrange* [Government edition of 1867]; Vols. I., II.

LAPLACE: *Oeuvres de Laplace* [Government edition of 1843]; Vols. I., II., III., IV., V., VI., VII. (bound in 4).

These books are to remain on our shelves as a permanent loan, until recalled by their owner.

Mr. Burnham has also deposited some important works in the library as a loan. I have transferred from my private library many books which were not in the Observatory collections. I have also taken time, which I could ill spare, to make a complete catalogue of every book and pamphlet in the library, because of its usefulness to the astronomers.

CIRCULATING LIBRARY.

This library continues to grow slowly through the gifts of friends. It is not public property. It is open to every individual on the mountain.

GIFTS TO THE OBSERVATORY.

The grateful acknowledgments of the Observatory are offered to its many friends who have in one way or another contributed to its progress during the last year. Among these we should first mention Regent Crocker, who, at his personal cost, dispatched the very successful eclipse expedition to Cayenne in December, 1889. The gift of an electric light plant (complete) by the Edison Manufacturing Company deserves our especial thanks.

The library continues to grow through the generous gifts of our correspondents in all parts of the world. A list of those who have contributed to our library, etc., is printed in the report of the Secretary of the University each year.

POST OFFICE AT MOUNT HAMILTON.

A Post Office has been established at Mount Hamilton, and Mr. S. W. Burnham has been appointed to be United States Postmaster. It is requested that in future all letters and parcels sent by mail should be addressed to "The Lick Observatory, Mount Hamilton, California, U. S. A." Money orders should be made payable at the Post Office of San José. Telegrams from points in the United States should also be addressed to San José. Cable telegrams, however, should be sent to "Astronomer, San Francisco." Parcels from abroad may be dispatched through the agents of the Smithsonian Institution (free of cost).

ASTRONOMICAL WORK AT THE LICK OBSERVATORY.

It is impossible, within a report of this kind, to do more than mention the varied and important works in hand. The list of publications of the different astronomers will exhibit the activity of the institution in a true light. In what follows I shall just touch upon the more important matters, giving greater space to accounts of the more novel departments.

SOLAR ECLIPSES OF JANUARY AND DECEMBER, 1889.

Both of these eclipses were observed with marked success by parties from the Lick Observatory. The expedition which observed the December eclipse was composed of two observers (Messrs. Burnham and Schaeberle), and was sent to Cayenne, South America, at the cost of Regent Crocker. The report of this party is in course of preparation.* The report of the January eclipse was distributed in October, 1889. The results of these two expeditions are of high value. The photographs of the corona are at least equal to any others which I have seen in all respects—and in some respects they are superior. From the beautiful photographs of Mr. Barnard, taken in connection with those secured by the Amateur Photographic Association of the Pacific Coast, the existence of the "extension" of the outer corona was demonstrated. From a consideration of all the evidence, Professor Schaeberle has been led to his mechanical theory of the solar corona, which, if confirmed, as it probably will be, will profoundly modify our ideas regarding solar phenomena.

NEW DOUBLE STARS.

Mr. Burnham has published the observations of one hundred and twenty-eight new double stars discovered by him since June, 1888 (Nos. 1,026 to 1,154), and he has made a great number of measures of known pairs, choosing such as are too difficult for smaller telescopes. The combination of the observer and the telescope makes the Lick Observatory *facile princeps* in this department of astronomy.

THEORY OF ASTRONOMICAL PHOTOGRAPHY AND OF PHOTOGRAPHIC PHOTOMETRY.

Studies on these subjects have been made here by Messrs. Schaeberle, Leuschner, and myself; and some of the results have been printed. Papers on these questions by Mr. Schaeberle and myself have been translated and published as part of the *Bulletin* of the International Astro-Photographic Congress, and I cannot but believe that these papers will modify the plan of work adopted by the Congress in an important degree.

ASTRONOMICAL PHOTOGRAPHY.

The large telescope is now regularly employed in photographic work. Success has already been attained in several directions. A number of subjects have, however, hardly been touched at all, such as the photography of planets and direct enlargement; and the various difficulties in our other work are not yet all conquered, or even understood, but enough has been done to show that success can be attained. The Observatory is very fortunate in counting among its astronomers Messrs. Burnham and Barnard, whose photographic skill and experience are equal to their astronomical ability. The other astronomers engage in the work of exposing and measuring the negatives, but all the photographic work proper has been done by these gentlemen, in addition to their other duties.

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*In course of printing, March, 1891.

PHOTOGRAPHS OF STARS.

In astronomical photography of stars we may have different objects in view. We may wish for a *picture* of the stars merely; or to measure their distances apart; or, finally, to determine their photographic brightness. The stars may be photographed as *dots* (*i. e.*, with the telescope driven by clock-work to follow the stars in their courses from rising towards setting) or as trails (the stars moving across the stationary plate from east towards west). In the first case (dots), we secure the impressions of fainter and fainter stars, according as the exposure is longer and longer. In the second case, we shall have no trails from the fainter stars, on account of the short exposure. With the great telescope a star on the equator moves $\frac{45}{1000}$ of an inch on the plate in one second of time, and $2\frac{7}{10}$ inches in one minute of time. Hence, only the brighter stars (about seventh magnitude or so) register their trails at the equator. The stars near the pole move very much slower, and stars of the thirteenth or fourteenth magnitude will trail.

To obtain star pictures or maps, long exposures are necessary with any telescope. If the instrument is intended to register the greatest possible number of stars, it should have a focus relatively short. Refractors with a double objective, on the model of a portrait combination, have a great advantage in this respect. The Harvard College Observatory has been using portrait lenses of eight inches aperture and forty-four inches focus for this purpose, and is now making a similar lens of twenty-four inches aperture and eleven feet focus. Reflectors are very suitable also, and, in my opinion, the next great telescope for photography should be a reflector of large aperture and short focus. Mr. Common, of London, has just mounted a five-foot reflector of this class, and its performance will be eagerly watched, in order to see what work is to be expected from instruments of this construction.

If stars are to be taken as dots, the clock must follow the motion of the stars very accurately, or else the telescope (or the photographic plate) must be moved by hand from time to time, to correct the irregularities of the clock-work motion and the small changes in the star's apparent position, due to refraction, etc.

In the Lick telescope the photographic focus is forty-seven feet six inches. The slightest wandering of the axis of the telescope, or the slightest flexure of the tube, etc., will produce a comparatively great displacement of the image on the plate.

Our driving-clock is electrically controlled from a standard clock, so that it goes at precisely the right rate. But we still find it necessary to move the plate by hand (by means of two screws at right angles to each other), to correct the minor irregularities of the train beyond the clock, refraction, flexure, etc. A guiding eye-piece is attached to the plate itself, and a guiding star is kept exactly at the intersection of two wires in the eye-piece, by moving a slide which carries both plate and eye-piece.

Such a long-focus telescope as ours cannot produce maps of the faintest stars as easily as such maps can be made by shorter focused instruments. On the other hand, we have an immense advantage in the scale of the picture: $1''$ of arc $= 0.003$ inches; $0''.01 = 0.00003$ inches. It is easy to measure the distance apart of two dots or trails (under a suitable microscope) correctly to $0''.03$ or so. Hence, the relative positions of stars (or of craters on the Moon, etc.) can be accurately and quickly fixed from our negatives.

To detect shrinkage of the film, we impress the image of a reticle ruled in squares on the negative before exposure, and, on development, we have these squares displayed. A comparison of the squares of the reticle with the squares of the negative will detect distortions of the film, etc. For accurate measures our negatives must be made on plate glass. The beautiful reticles which we have were ruled at the Potsdam Observatory by Professor H. C. Vogel and Dr. Scheiner.

Thus, wherever scale is of importance, as for measures of parallax, etc., the great telescope has a decided advantage over shorter focused telescopes. A distance of $2{,}000''$ to $3{,}000''$ of arc can be measured with a probable error of not more than $0''.1$ or $0''.2$.

Trails of stars can be used to measure differences of declination (perpendicular to the trails), and thus to determine parallax, etc. Trails are also suitable for measures of the photographic brightness of stars. For this purpose, it seems best to give all stars the same exposure, and this can be effected (as suggested by Mr. Schaeberle of the Lick Observatory) by causing the plate to follow the stars in right ascension, but to trail in declination; that is, to make the stars impress themselves on a plate which follows their motion from east to west, but which is also driven by a second clock work at a uniform rate from north to south. Every star sufficiently bright can thus be compared with Polaris, and the photographic brightness of each star, in terms of that of Polaris as unity, can be deduced. The same thing can be (less accurately, I think) determined by measuring the diameter of the images of the various stars, and by comparing the diameters of the various stars with that of Polaris on the same plate.

The subject of photographic photometry is a very difficult one, both theoretically and practically, and involves a knowledge of the relation between the intensity of the stain on the plate and the exposure time. Captain Abney, whose authority is of the highest, has come to the conclusion that "the deposit of silver made by different intensities of light varies in density* directly as the intensity of light acting—this, of course, within such limits that the reversal of the image is not commenced—and that the film is not in any part exhausted of the silver salt that can be reduced." Our own experiments on this subject (which are just begun) seem to indicate a somewhat less general conclusion.

As the question is fundamental, it may not be improper to give the conclusions we have so far attained, with the proper reserve, since further experiment may modify the results now apparently reached. For a light of a given intensity I, for example, it seems to follow from our work, that for very short exposures the density of the deposit D increases very much faster than directly as the time, T. For longer exposures, the density D' becomes more nearly proportional to T'; for still longer exposures, the proportion again falls off, long before the halation stage is reached.

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*I understand this to mean "varies in opacity," though I may misinterpret the expression.

Thus, for light of intensity, I, we have, from zero to T, D varies more rapidly than directly as the time; from T' to T'', D varies as the time; from T'' to T''', D varies less rapidly than directly as the time. For light of intensity, i, the density d goes through these three stages at different intervals $t'—o$; $t''—t'$; $t'''—t''$.

A very important point seems to be that t' is not the same as T'; t'' not the same as T'', etc., but that t varies with i. That is, if the deposit on a given plate is proportional to the time, between five seconds and ten seconds, for example, for a light, i, it will not be proportional to the time between these limits for a light of greater intensity, I. For I, it may be so proportional between other limits of exposure, as three seconds and seven seconds, and so on.

If these results are true, they seriously modify photometric conclusions hitherto reached by means of photography.

I have been willing to speak at this time of experiments which are still in progress, and whose results are by no means final, on account of the great importance of this question, and in the hope of inciting others to experiments on the same subject.

Mr. Schaeberle has found that if d be the diameter of a star image (dot) taken with a 6-inch Dallmeyer portrait lens in a time t on a Seed 26 plate, with a diaphragm Q inches in aperture in front of the objective, that we can express this diameter as follows:

$$d=A+B \log Q+C. Q. \log t.$$

A, B, and C are constants which must be determined for each plate. It is probable, though not proved as yet, that this equation is only true between certain limits i, and I, of intensity of star light, and between certain limits t, and T, of exposure time. It has served very well to predict the diameter of over-exposed stars.

PHOTOGRAPHS OF SOLAR ECLIPSES.

The solar eclipse of January 1, 1889, occurred soon after the Observatory was founded, and before suitable photographic instruments were available. Nevertheless, Mr. Barnard contrived to take most capital negatives with some small cameras, and especially with an ordinary telescope of three inches aperture (reduced to $1\frac{3}{4}$ inches), and a focus of forty-nine inches. (Seed 26 plates were used, and exposures of 1, 3, and $4\frac{1}{2}$ seconds.) The greatest pains were taken in focusing and in development, and his results are consequently of first class excellence, and comparable with those obtained by much larger instruments specially adapted for photography.

The Amateur Photographic Association of the Pacific Coast sent a large and competent party to the eclipse, under the direction of Mr. Burckhalter, and their negatives were kindly turned over to the Lick Observatory for discussion and publication. At this eclipse not only was the corona thoroughly depicted, but the negatives of Mr. Barnard, of the Observatory, and of Messrs. Lowden and Ireland, of the A. P. A. P. C.

(and many others), showed a new and very remarkable extension to the outer corona, never before photographed. As this "extension" was shown on several negatives taken by eleven persons at four different stations, there seems to be no question as to its veritable existence.

The expedition sent from the Lick Observatory at the cost of Hon. C. F. Crocker, to observe the eclipse of December, 1889, was likewise fully successful. Both Mr. Burnham and Mr. Schaeberle secured a number of capital photographs of the corona. Their reports on this eclipse are not yet published, and therefore I must content myself with a mere reference to them in this place. My own measures of their negatives are given in the table below.

Following the suggestion of Captain Abney and the example of Mr. W. H. Pickering of the Harvard College Observatory, the Lick Observatory plates were "standardized." That is, a portion of each plate was impressed with the light from a standard lamp, shining for a known time through a small hole at a known distance. The lamp produced small squares on the plates, and after development these squares were compared with the different parts of the corona, in order to measure the photographic brightness.

Assuming with Captain Abney that the stain on the plate is proportional to the exposure, I found the following results, which are compared with those of Mr. Pickering in 1886:

	PICKERING—1886.	HOLDEN—Jan., 1889.	HOLDEN—Dec., 1889.
Intrinsic actinic brilliancy of the brightest parts of the corona	0.031	0.079	0.029
Intrinsic actinic brilliancy of the polar rays (about)		0.053	0.016
Intrinsic actinic brilliancy of the sky near corona	0.0007	0.0050	0.0009
Total actinic light of the corona	37.	60.8	26.2
Total actinic light of the sky	52000.	185625.	33412.
Ratio of total coronal to total sky light (actinic)	1 to 1,400	1 to 3,043	1 to 1,285
Ratio of intrinsic brilliancy of the brightest parts of the corona to that of the sky (actinic)	44 to 1	16 to 1	32 to 1
Intrinsic actinic brilliancy of the sky at 1° from the Sun in daylight (average)	40.		
Intrinsic actinic brilliancy of the full Moon	1.66		
Total actinic light of the full Moon (SD = 16′.75)	1,461.5		
Intrinsic actinic brilliancy of sky within 5° of the full Moon	0.000064		
Magnitude of the faintest star shown on the eclipse photographs		2.3	

From this table (Column II.) it appears that the polar rays are about eleven times as bright as the sky; and that the brightest parts of the corona are one and one half times as bright as the polar rays. Hence, these are usually masked when they are projected upon the bright wings.

The intrinsic brilliancy of sunlight *plus* corona (40.08) is $\frac{1}{500}$ part more than the brilliancy of the ordinary daylight 1° from the Sun (40.0). Hence, it would seem that the corona (which has a continuous spectrum) can never be photographed in full daylight on our present plates.

As the planet Vulcan (?) (if any such planet exists) is certainly not brighter than fifth magnitude, it follows that we cannot hope to photograph it on our present plates.

The corresponding results from the eclipse of December 21, 1889, are given in Column III. For reasons which I have given elsewhere, I think the results here given must be considered as approximate only.

PHOTOGRAPHS OF THE MOON.

Our first experiments in photography with the large telescope were made by Mr. Burnham, on the Moon. As no suitable shutter was then available, the aperture was reduced to twelve and eight inches to increase the exposure time.

The best of these experimental pictures are very fine. Enlargements of them have been made on glass by Mr. Burnham and Mr. Barnard, and I have been able to locate the minutest details of structure on these positives. Parallel walls on the Moon, whose tops are no more than two hundred yards or so in width, and which are not more than one thousand to one thousand two hundred yards apart, are plainly visible.

In the examination of such pictures there is an immense advantage in using a positive copy on glass (which presents the different features in their natural luster) rather than the original negative. The same thing is true of pictures of solar eclipses.

In certain negatives many details can be brought out by enlargement, or by reductions, that entirely escape notice on the originals.

PHOTOGRAPHS OF THE MILKY WAY.

Mr. Barnard made some experiments in this direction in 1889, which promise the most satisfactory results. The instrument used was a 5-inch portrait lens, and the exposures were one hundred and eighty to two hundred and forty minutes.

It is proposed to photograph the whole of the Milky Way on one scale and with one exposure in this manner.

PHOTOGRAPHS OF NEBULÆ AND COMETS.

Very little has yet been done here in these important fields. A few nebulæ have been photographed for experiment, with good results. Mr. Barnard photographed Davidson's comet, with a portrait lens and an exposure of ninety minutes.

Mr. Barnard's photographs of the nebula of Andromeda, with a portrait lens, are highly interesting and important.

The excellence of the great telescope will not be shown by extremely great extension of faint nebulæ, but rather by the very large scale on which these objects are taken. It has its own appropriate field, and within that field it promises admirable results. Many vexatious hindrances have occurred in making this great instrument ready for photographic use, but it is now in full activity.

NEED FOR AN ADDITIONAL ASSISTANT WITH THE LARGE TELESCOPE.

The large telescope is, in fact, the Lick Observatory, and all the other pieces of apparatus are subsidiary to it. It has three fields, namely: *visual, photographic, spectroscopic.* Its supremacy over other telescopes is as marked in the two latter fields as in the former; and corresponding results are looked for. Most of its visual work is done by Mr. Burnham, and he is assisted by his son, the Secretary of the Observatory, in his observations. It is indispensable that assistance should be provided for the photographic and spectroscopic observations. It is practically impossible for a single observer to do work in either of these last two fields. It is therefore of the first importance that we should have a photographic and spectroscopic assistant added to our force. He must not only be competent to aid in the observations, but he must also be able to perform the calculations necessary in the reductions of the work. Without such calculations no results can be obtained. Such an assistant as is needed can be obtained for a salary of $1,800.*

SPECIAL INVESTIGATIONS OF THE VARIOUS INSTRUMENTS OF THE OBSERVATORY.

Mr. Keeler has made a careful study of the chromatic aberration of the visual object glass of the great telescope. The photographic object glass is now being studied by myself. The vibration of the pier, etc., has been determined by Professor Schaeberle. Mr. Burnham has made a determination of the value of one turn of the micrometer screw of the great telescope. Professor Schaeberle, as well as Mr. Leuschner, has made elaborate studies relating to the Repsold circle. I have mentioned only the most important work of this kind.

MERIDIAN CIRCLE OBSERVATIONS OF VICTORIA AND COMPARISON STARS.

In connection with astronomers in the Northern Hemisphere, the Astronomer Royal at the Cape of Good Hope, Dr. David Gill, is observing the planet Victoria for the determination of its parallax (and hence of the solar parallax). He has requested various observatories to determine, by meridian observations, the positions of the planet and of thirty-seven comparison stars. This work has been done at the Lick Observatory by eighteen nights of observations, between June 8 and July 8, 1889, and the results will soon be ready for publication. From a series of experiments by Professor Schaeberle it was found that (thanks to the designer of the large pivots, nearly four inches in diameter) much better results could be obtained when the observations were made without clamping the instrument. The clamp was accordingly removed (some months ago), so that all of the observations referred to above were made with the nearly counterpoised instrument hanging freely in the wyes. That this variation from the usual method is to be approved, when the proper precautions are taken, seems to be shown by the smallness of the probable errors of observation, which, for a single observation in R. A. and Dec., are about $0^s.020$ and $0''.25$, respectively. These figures also show that the Repsold meridian circle is capable of first class work, and that the refraction as given in Vol. I., *Publications of the Lick Observatory*, is not very far out of the way.

PROGRAMME FOR MERIDIAN OBSERVERS OF STARS.

When the Repsold meridian circle was ordered, it was designed to use it in determination of the absolute positions of the fundamental stars. Experiments during 1888 and 1889 showed Professor Schaeberle (in charge of the circle) and myself that observations during the daytime were not at all comparable in precision with night observations. It is very rare to find the images in the daytime steady enough to deserve weight 2 (5 = perfectly steady, 1 = extremely unsteady), while there are very many nights of weight 4 and weight 5 during the fair season (May to November). The Sun, Mercury, and Venus were often observed at transit during 1889, and the images were always found to be of weight 1, or less. For this reason we reluctantly decided to abandon the plan of referring star places in Right Ascension to the Sun, either directly or through Mercury and Venus.

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*The Lick Observatory has five observers and computers. The following named observatories have five or more now employed: Algiers (5), Besançon (8), Bordeaux (6), Brussels (8), Cape of Good Hope (7), Cordoba (5), Greenwich (about 20), Grignon (5), Harvard College Observatory (36), La Plata (7), Leipsig (9), Lisbon (5), Madrid (6), Marseilles (7), Melbourne (8), Mendon (7), Mexico (6), Naples (5), Nice (8), Oxford (5), Palermo (6), Paris (17 astronomers and many computers), Potsdam (7), Pulkowa (16), Rio Janeiro (16), Rome (6), Santiago de Chile (5), Tacubaya (5), Toulouse (5), Vienna (7), Washington (7 observers, 3 computers, 9 naval officers, total 19).

All our R. A. observations must then be differential.

The work next in importance seemed to be the observation of all the stars of the English, the French, and the American Nautical Almanacs which are visible at Mount Hamilton, and which are *not* included in the star list of the *Berliner Jahrbuch*. There are one hundred and twenty-seven such stars. If each were referred to the *B. J.* system, we should be far on the way towards making all meridian observations in the Northern Hemisphere homogeneous, and the extension of the *B. J.* system to the Southern Hemisphere would be much facilitated. Accordingly, a plan was prepared for doing this work and was submitted to Professor Auwers, who was kind enough to give us the benefit of his counsel. This work will be begun shortly.

MISCELLANEOUS STARS.

A list of miscellaneous stars will also be observed, each star twice. The Observatory will be glad to place any comparison stars needing determination on this list, and to observe and publish in due time. We cannot, however, undertake to make and publish such observations very promptly, as the stars of the other list take precedence, and as there is only one observer for the meridian circle.

The latitude of the Observatory will be determined from the four circumpolars, and also by Tallcott's method and by prime vertical transits.

A determination of the telegraphic longitude has just been published by the U. S. Coast and Geodetic Survey (*Bulletin No. 13*, 1889). The longitude is $8^h\ 06^m\ 34^s.81 \pm 0^s.1$.

DETERMINATION OF THE REFRACTION.

A list of stars suitable for the determination of the refraction is now under observation by Professor Schaeberle.

PHOTOGRAPHIC ATMOSPHERIC ABSORPTION.

Observations to determine this important datum have been made at Mount Hamilton and Cayenne by Professor Schaeberle, and these observations have been continued (and probably completed) by Mr. W. W. Campbell during the summer of 1890. The instrument employed was kindly lent to the Observatory by the U. S. Naval Observatory, Washington.

SPECTROSCOPIC OBSERVATIONS.

Mr. Keeler, in charge of this department, has made a series of observations on the spectra of the planets, of some of the variable stars, of one comet, and of some planetary nebulæ, and of a few of the brighter stars. Most of the results are, as yet, unpublished. The main research to be undertaken with the great telescope has not yet been begun, namely: the spectroscopic determination of the motions of a large list of stars in the line of sight. The results to be obtained from this work will be at least as important as any which the great equatorial can yield, as they will furnish the solution to the question of the motion of the solar system in space. Mr. Keeler has determined (for the first time) the motions of nebulæ in the line of sight.

ON THE ESTABLISHMENT OF A STANDARD MERIDIAN LINE FOR SANTA CLARA COUNTY, CALIFORNIA.

A few months ago, at my suggestion, Mr. Charles Herrmann, County Surveyor of Santa Clara County, and Mr. A. T. Herrmann, Surveyor and Civil Engineer, obtained the permission of the County Supervisors to establish a standard meridian line in San José, for the benefit of surveyors, with a sufficient sum of money to provide suitable monuments.

It was agreed that the astronomical staff of the Observatory should make the necessary observations without expense to the county, and Mr. Keeler was appointed to carry out the work, which was done in a very satisfactory manner.

Absolute directions on the earth can only be determined by reference to the heavenly bodies. The magnetic needle has been and still is extensively used as a secondary means of determining directions, but the angle which the magnetic needle makes with the true meridian is constantly changing, and is, moreover, subject to sudden and irregular variations, so that, even with the greatest precautions, the compass is an unsafe guide. Ignorance of these facts, or of the amount of necessary allowance from lack of a suitable standard of reference, has given rise to an endless amount of litigation in this country. It is safe to say, that if each county in the Union had legally established a standard meridian in early days of its settlement, the gain to the country would have to be estimated by hundreds of thousands of dollars.

The Lick Observatory is ready to coöperate with county officers in the work of establishing standard meridian lines at the various county seats, and simply asks that the actual expenses of its observers in the field shall be paid.

DRAWINGS OF JUPITER AND MARS.

A series of beautiful drawings of Jupiter was made by Mr. Keeler during the opposition of 1889, most of which are still unpublished. Sketches of Mars during 1888 and 1890 have been made by Messrs. Schaeberle, Keeler, and myself. Mr. Barnard has also secured a great number of sketches of both Jupiter and Mars.

COMET OBSERVATIONS AT MOUNT HAMILTON.

From a summary of the comet observations made all over the world, during part of 1888 and all of 1889, which is given in the *Vierteljahrsschrift der Astronomische Gesellschaft* (1890, page 70), the following is condensed:

Comet 1887 V = Olbers' comet was observed at Mount Hamilton by Mr. Barnard until July 5, 1888. His last observations were three months later than those at any other observatory.

Comet 1888 IV = Faye's comet was observed at the Lick Observatory four days after the last European observation (Vienna).

Comet 1888 V: The last observation was made at the Lick Observatory.

Comet 1889 I was discovered at the Lick Observatory by Mr. Barnard, on September 2, 1888. This comet is remarkable for the long duration of its visibility. It was last observed at Mount Hamilton in August, 1890, nearly two years after discovery. No other comet has had a longer period of visibility. The great comet of 1811 was visible for sixteen months and twenty days only.

Comet Brooks, 1889, January 14 (?). This comet was discovered by Brooks on January 14. It was never seen after that date either by its discoverer or by other observers. At Mount Hamilton it was very carefully sought for, both by Mr. Barnard and by Doctor Swift, who was here on a visit.

Comet 1889 II was discovered by Mr. Barnard 1889, March 31. The last observation at Mount Hamilton was made on November 16, after which time severe storms set in. The last observation was made at Vienna on November 21. Mr. Barnard observed it with the great telescope in August, 1890.

Comet 1889 III was discovered by Mr. Barnard, 1889, June 23. It moves in an elliptic orbit, with a period (according to Dr. Berberich) of 128.3 years. It was last observed at Mount Hamilton, August 6.

Comet 1889 IV was discovered by Mr. Davidson, in Queensland, July 19. It was photographed at the Lick Observatory by Mr. Barnard, and its photographic brightness was determined (see *Publ. A. S. P.*, Vol. I, p. 34), as well as its spectrum (*loc. cit.*, p. 36). The last observation was made (November 21) at Vienna.

Comet 1889 V was discovered by Brooks 1889, July 6. It moves in an elliptic orbit, with a period of seven years. On August 1 the comet was found to consist not only of one body, but of a family of comets moving together in space. This discovery was made by Mr. Barnard, and has been described in *Publ. A. S. P.*, Vol. I, p. 72. The companion comets were observed by him until November 25. The last observation of the main comet was made at Mount Hamilton, March 20, a month later than at any other observatory. Still another interesting feature is presented by this comet in the similarity of its elements to those of Lexell's lost comet, as pointed out by Mr. Chandler and described in *Publ. A. S. P.*, Vol. II, p. 21.

Comet 1889 VI was discovered by Professor Swift, at Rochester, on November 16. Its orbit is elliptic, with a period of seven or eight years. The last observation was made at Mount Hamilton on January 21, 1890.

Comet 1890 was discovered by M. Borelly, at Marseilles, on December 12. This is the first comet discovered in Europe since 1886.

The foregoing summary shows that the excellent atmosphere at Mount Hamilton has made it possible for the Lick Observatory to render material services to cometary astronomy by following faint comets as long as they are visible at all, thus making greater arcs available in the calculation of their definite orbits.

PHOTOGRAPH OF THE DAVIDSON COMET.

The comet discovered by Mr. Davidson at Queensland, on July twenty-first, was photographed at the Observatory by Mr. Barnard, with the new Willard lens (about five inches aperture, thirty inches focus) on July thirtieth. A Seed 26 plate was used, and an exposure of ninety minutes was given. The camera was mounted on the top of the 12-inch equatorial, and the camera was kept directed at the comet by moving the slow motion screws in R. A. and in Dec. As the comet had a rapid motion in reference to the stars, the latter appeared as *trails* about 13′ to 14′ long. This was the comet's motion in ninety minutes of time. The head of the comet shows as a neat round mass. The tail is fan-shaped, with its borders convex to the axis, and very narrow at the root. It can easily be traced 20′ and it is evident for about 53′. Mr. Barnard could trace it no further than 50′ or so, with the telescope.

Measures of its brightness were made by Professor Holden, and its spectrum was observed by Mr. Keeler.

PHOTOGRAPHING THE MILKY WAY.

The great success obtained by Mr. Barnard in his preliminary experiments with the Willard photographic lens (presented to the Lick Observatory by Hon. C. F. Crocker) has led to the determination to employ this lens ($a=5.9$, $f=30.7$ inches) in a systematic study of the Milky Way by means of photography. Mr. Crocker has ordered a complete mounting for this lens, which he will present to the Observatory; and it is expected that this work can be commenced during 1891.

LONGITUDES IN ALASKA.

The United States Coast Survey has a party of observers in Alaska engaged in observing occultations of stars for longitude. Their observations will be doubled in value if observations of the same sort are available from a station whose longitude is known. Accordingly, Mr. Barnard and Mr. Leuschner have secured a long and valuable series of occultations at Mount Hamilton, and these have been communicated to the Superintendent of the United States Coast Survey in Washington.

TIME SERVICE.

The time service is continued as before under the charge of Mr. Keeler. The work at the Observatory is done in the most exact manner, but the telegraph line to San José is in such an unsatisfactory condition that our signals cannot be properly transmitted after they leave our building.

If the proper precautions were taken, every railway station between San José and Ogden, San José and Portland, Oregon, and San José and El Paso would regularly receive our signal every day at noon.

EARTHQUAKES IN CALIFORNIA.

A regular series of observations of all earthquake shocks and tremors is maintained at Mount Hamilton and at Berkeley, and at various other stations in California and Nevada. The results are all sent here, and at the end of each year a report is made to the United States Geological Survey in Washington, which report is printed in their *Bulletins*. This work is under the charge of Mr. Keeler.

METEOROLOGICAL OBSERVATIONS.

Regular meteorological observations at 7 A. M., 2 P. M., and 9 P. M. of the wind, rainfall, humidity, pressure, and temperature are made and reduced daily by Mr. A. J. Burnham, in addition to his other duties.

FORCE OF GRAVITY AT MOUNT HAMILTON AND SAN FRANCISCO.

Mr. E. D. Preston, of the U. S. Coast and Geodetic Survey, has published his report on gravity determinations in the Pacific Ocean (*Bulletin No. 11*, U. S. C. and G. S., 1889). The force of gravity at Washington being 1.000000, that at San Francisco (Professor Davidson's Observatory) is 0.999854, and at the Lick Observatory it is 0.999544. Determinations of g at four stations in the Hawaiian Islands and for a station at Caroline Island are also given.

PUBLICATIONS OF THE LICK OBSERVATORY.

Vol. I., in quarto, was printed by the Lick Trustees in 1887, and has been distributed. Succeeding volumes will contain Mr. Burnham's General Catalogue of Double Stars, Professor Schaeberle's Catalogue of the Positions of Struve's Double Stars, a Catalogue of thirty-eight thousand stars from the Washington Zones by myself, etc.

The Report of the Eclipse of January 1, 1889, in octavo, was printed by order of the Regents, in the summer of that year; and the manuscript of a similar Report of the Eclipse of December, 1889, is nearly ready for the printer. Our current observations are regularly communicated to the various scientific journals.

Since June 1, 1888, the astronomers of the Observatory have published articles and memoirs as follows:

AUTHOR.	Separate Works.	Shorter Notices.	Totals.
E. S. Holden	54	27	81
S. W. Burnham	19	5	24
J. M. Schaeberle	11	4	15
J. E. Keeler	12	5	17
E. E. Barnard	43	7	50
C. B. Hill	4	0	4
A. O. Leuschner	12	2	14
Sums	155	50	205

CIRCULATION OF THE PUBLICATIONS OF THE LICK OBSERVATORY.

In November, 1888, a copy of Volume I of the *Publications of the Lick Observatory* was sent to a library in Boston. A letter lately received states that during the past year it has been taken out by eighty-seven persons, and that nineteen others are registered to receive it in their turn. If the whole edition is read as faithfully, the work will have been useful.

REPORTS OF THE SOLAR ECLIPSES OF JANUARY AND OF DECEMBER, 1889.

The edition of the Report of the Eclipse of January, 1889, has been distributed, and there are no more copies on hand. The Report on the December Eclipse is in course of preparation. It will probably contain:

I. Reports on the Total Solar Eclipse of December, 1889, by Messrs. Holden, Burnham, Schaeberle, Barnard.

II. Reports on the Total Eclipse of the Moon of July, 1888, by all the astronomers.

III. Catalogue of the Library of the Lick Observatory, by Edward S. Holden.

It will be illustrated with silver prints from the eclipse negatives, and from drawings, etc.

AWARD TO THE LICK OBSERVATORY AT THE PARIS EXPOSITION.

The Lick Observatory exhibited at the Paris Exposition a frame of photographic views of Mount Hamilton and some photographs of the Moon taken with the great telescope. The negatives were made by Messrs. Burnham and Barnard, and the smaller prints were also by them. The enlargements from these negatives were made by Mr. Taber of San Francisco. A gold medal was awarded to the Observatory for the whole exhibit.

COPIES OF PHOTOGRAPHS TAKEN AT THE LICK OBSERVATORY—HOW TO OBTAIN THEM.

The Director of the Lick Observatory has been authorized to supply copies of some of the negatives taken at Mount Hamilton to certain photographers, in order to make such copies available generally. Copies of some of our negatives have been furnished to quite a number of firms accordingly. Some of these firms (I. W. Taber, 8 Montgomery Street, San Francisco; Hill & Watkins, Santa Clara Street, San José, and Gayton A. Douglas & Co., 185 Wabash Avenue, Chicago) are prepared to furnish prints, enlargements, and lantern slides from such negatives as they now have. Other negatives will be furnished to them from time to time.

In conclusion, I beg to say that the Lick Observatory has already taken a foremost place among the great observatories of the world. It is no more than just to the astronomers here to add that this has been accomplished under circumstances of peculiar difficulty.

It would have been entirely impossible to have done this at all, had it not been for the generous and thoughtful support of the Board of Regents as a whole, of the Lick Observatory Committee in particular, and of the Secretary of the University.

Respectfully submitted.

EDWARD S. HOLDEN,
Director of the Lick Observatory.

SEPTEMBER 1, 1890.

PROFESSIONAL COLLEGES.

Hastings College of the Law.

[No biennial report for 1888–90 has been received from the College of Law.]

Medical Department.

To the President of the University of California:

Sir: I have the honor to submit to you the following report concerning the Medical Department of the University:

Since the report of the Dean of this College to the President of the University two years ago, two classes have graduated—the class of 1888, numbering eleven; the class of 1889, fifteen.

During the year ending June 30, 1890, thirty-one students have entered the College. There are attending the College at present, seventy students, eighteen of whom are candidates for the degree to be conferred at the next commencement. Three students are pursuing a post-graduate course.

I deem it my duty to call to your attention again the urgent need felt by the Medical Faculty for more suitable quarters. The school still occupies the building donated by the late Dr. H. H. Toland, and each year the unsuitableness of its location and the unfitness of the building for the modern methods of medical instruction become more evident. The condition of the building is such that much of the income of the College must be spent in repairs. This renders it impossible for the Faculty to provide the laboratories and appliances so important for medical instruction. By the sale of a portion of the Stockton-Street property the Board of Regents now holds for the benefit of the Medical College a piece of property opposite the City and County Hospital. It is a most eligible site for a medical school. It is the earnest wish of the Faculty that the Board of Regents and the President of the University will urge upon the State Legislature the necessity of an appropriation for the purpose of erecting upon the land a building suitable to the needs of a modern medical college.

Respectfully submitted.

R. A. McLEAN,
Dean of the Medical Faculty.

College of Dentistry.

To the President of the University of California:

Sir: Your favor requesting a report of the condition of the department under my care was duly received.

There have been no changes in the Faculty proper since our last report, excepting the retirement of Professor C. L. Goddard from the office of Dean, on account of ill health.

The same conditions prevail now as heretofore, viz.: "lack of room and funds." The attendance last year showed an increase of 50 per cent over the year before, and the attendance this year is fully 30 per cent over that of last year. This emphasizes our want of room, and makes a change of location imperative.

With the opening of the present term we adopted the plan of keeping our infirmary open all the year round, placing in charge a competent Superintendent, who is an adjunct to the operative staff. This, although an additional expense to the department, is amply met in the added fees for clinic service; and the discipline secured is conducive to better and more systematic training of the classes.

With the beginning of the session of 1892, this College will, in obedience to a regulation of the National Association of Dental Faculties, adopted in August, 1889, require an attendance upon three full courses in separate years of all matriculates, regardless of prior experience. This is a pronounced step in advance, and implies a graded course, with a corresponding advance in curriculum.

The class of material coming to our school is much more encouraging than heretofore, which we ascribe to the character of our entrance examinations and method of conducting the same. Up to the session of 1888 it was customary for a committee of the Faculty to take charge of the examination. This being usually conducted in the evening, and under very unfavorable circumstances, the results were far from satisfactory.

Beginning with the session of 1888, there was instituted the plan of employing some well known educator as examiner for the term, with fixed dates for the examinations, which are held in the College lecture-room, occupying the entire day. The rejections number from 20 to 30 per cent, in the face of which the classes have increased, as before mentioned. Many of the matriculates for the session of 1890 were exempt from the entrance examination, by reason of being graduates of high schools or academies.

The pressing need of our department is a central location in more commodious quarters, where the clinical department will be more readily accessible to the Faculty and instructors, as well as to those who avail themselves of the privileges of the infirmary. This much accomplished, and with funds enough to secure the necessary equipment of dental and physiological laboratories, the College can readily support the expense of maintenance from its fees.

Respectfully submitted.

L. L. DUNBAR,
Dean of the Dental Faculty.

College of Pharmacy.

[No biennial report for 1888–90 has been received from the College of Pharmacy.]

LIST OF PUBLISHED WRITINGS OF OFFICERS OF THE UNIVERSITY, 1888-89 AND 1889-90.

[NOTE.—In a few cases, the publications here mentioned are of date prior to 1888; most of these were not included in the lists published in the Biennial Report of the President, 1888.]

WINSLOW ANDERSON, M.D., Assistant to the Chair of Materia Medica and Medical Chemistry.

Mineral Springs and Health Resorts of California. Adulterations in Food Products. *Pacific Medical Journal*, December, 1889.

EDWARD EMERSON BARNARD, A.M., Astronomer.

1. Occultation of 47 Libræ by Jupiter, June 9, 1888. *Astronomical Journal*, Vol. VIII., p. 64.
2. Discovery and Observations of a Comet *e*, 1888. *Astronomical Journal*, Vol. VIII., p. 102; *Astronomische Nachrichten*, No. 2,862.
3. Drawings of Comet, 1888, I. *Astronomische Nachrichten*, No. 2,859. (With a plate.)
4. Discovery of a Comet *f*, 1888. *Astronomical Journal*, Vol. VIII., p. 128. Communicated to *California Academy of Sciences.*
5. Observations of OLBERS' Comet (1887, V.). *Astronomische Nachrichten*, No. 2,861.
6. Discovery and Observations of a Comet *f*, 1888. *Astronomische Nachrichten*, No. 2,871; *Astronomical Journal*, Vol. VIII., p. 134.
7. Note on the Orbit of Comet *e*, 1888. *Sidereal Messenger*, 1888, p. 456.
8. Observations of Comet *e*, 1888. *Astronomical Journal*, Vol. VIII., p. 120.
9. On a search for the Comet reported January 15, 1889, by Mr. BROOKS. *Astronomical Journal*, Vol. VIII., p. 168.
10. Partial Eclipse of the Moon, January 16, 1889. *Sidereal Messenger*, March, 1889, p. 137.
11. Discovery and Observations of Comet BARNARD (March 31). *Astronomical Journal*, Vol. VIII., p. 183; *Astronomische Nachrichten*, No. 2,894; *Astronomical Journal*, Vol. IX., p. 5; *Astronomische Nachrichten*, No. 2,899; *Astronomische Nachrichten*, No. 2,901.
12. Report on the Total Eclipse of January 1, 1889. In the *Lick Observatory Report*, p. 56.
13. Observations of FAYE'S Comet. *Astronomische Nachrichten*, No. 2,922; *Astronomical Journal*, Vol. IX., p. 29.
14. Anomalous Tail of Comet I, 1889. *Astronomical Journal*, Vol. IX., p. 32; *Astronomische Nachrichten*, No. 2,906.
15. The Nebula G. C. 2,091. *Monthly Notices, R. A. S.*, Vol. XLIX., p. 418.
16. The Cluster G. C. 1,420, and the Nebula N. G. C. 2,237. *Astronomische Nachrichten*, No. 2,918.
17. Discovery and Observations of a Comet (June 23). *Astronomische Nachrichten*, Nos. 2,906 and 2,910; *Astronomical Journal*, Vol. IX., p. 47 and p. 55.
18. Observations of the Zodiacal Counter-glow. *Astronomical Journal*, No. 168.
19. Observations of Comet *d*, 1889 (BROOKS, July 6). *Astronomical Journal*, Vol. IX., p. 54.
20. Comet DAVIDSON (July 21, 1889), (1889, *e*). *Astronomical Journal*, Vol. IX., p. 66.
21. Discovery and Observations of Companions to Comet BROOKS (July 6, 1889). *Astronomical Journal*, Vol. IX., p. 64; *Astronomische Nachrichten*, Nos. 2,914 and 2,919.
22. On the Companions to Comet *d*, 1889 (BROOKS, July 6). *Astronomical Journal*, Vol. IX., p. 77; *Sidereal Messenger*, October, 1889, p. 360.
23. Comet V, 1888 (BARNARD, October 31). *Astronomical Journal*, Vol. IX., p. 87.
24. Observations of Comet *c*, 1889 (BARNARD, June 23). *Astronomical Journal*, Vol. IX., p. 86.
25. The eye-end of the Great 36-inch Refractor of the Lick Observatory. *Himmel und Erde* (not yet printed).
26. Occultation of *Jupiter*, 1889, September 3. *Astronomical Journal*, Vol. IX., p. 85.
27. A very Remarkable Comet (BROOKS, July 6, 1889). *Publ. A. S. P.*, Vol. I., p. 72.
28. Observations of Comet *f*, 1889 (SWIFT, November 16). *Astronomical Journal*, Vol. IX., pp. 119, 131; Vol. X., p. 7.
29. Observations of the Eclipse of *Japetus* in the shadows of the Globe, Crape Ring and Bright Ring of *Saturn*, November 1, 1889. *Monthly Notices, R. A. S.*, Vol. L., p. 107.
30. Observations of Comet *g*, 1889 (BORELLY, December 12). *Astronomical Journal*, Vol. IX., pp. 120, 131.
31. On some celestial photographs made with a large portrait lens at the Lick Observatory. *Monthly Notices, R. A. S.*, Vol. L., p. 310.
32. Observations of the Occultation of the planet *Jupiter*, March 23, 1889. *Sidereal Messenger*, May, 1889, p. 222.
33. Observations of *Jupiter* with a 5-inch refractor during 1879–1886. *Publ. A. S. P.*, No. 5.
34. Report on the Solar Eclipse of December, 1889. In *L. O. Eclipse Report.*

35. Observations of Comet *a*, 1890 (Brooks, March 19). *Astronomical Journal*, Vol. IX., p. 189.
36. Comet *d*, 1889 (Brooks, July 6). *Astronomical Journal*, Vol. X., p. 4.
37. The longest known Duration of Visibility of a Comet (Comet I, 1889). *Sidereal Messenger*, June, 1889.
38. Physical and Micrometrical Observations of the Companions to Comet V, 1889 (Brooks, July 6). *Astronomische Nachrichten*, 2,988–2,989.
39. Unsuccessful search for Brorsen's Comet (1889, December 12; 1890, April 22). *Astronomische Nachrichten*, 2,979.
40. Note on Comet 1889, I. *Astronomische Nachrichten*, 2,976.
41. The Lunar Appulse of June 2, 1890. *Astronomical Journal*, Vol. X., p. 31.
42. Filar Micrometer Observations of *Eucharis* (181). *Astronomische Nachrichten*, 3,004.
43. Note on the Nebula G. C. 4,036, N. G. C. 5,834. *Astronomische Nachrichten*, 2,995; *Publ. A. S. P.*, Vol. II., p. 247.
44. Observations of small spots on *Jupiter*.
45. Observations of the near approach of *Mars* and *Saturn* on September 19, 1889. *Publ. A. S. P.*, Vol. I., p. 82.
46. Probable return of Lexell's Comet. *Publ. A. S. P.*, Vol. II., p. 21.
47. Occultations of Stars observed in Oct., Nov., Dec., 1889. *Publ. A. S. P.*, Vol. II., p. 24.

The following briefer notes have been printed in *Publ. A. S. P.*:

No.	Date.	Title of the Note.
3	July 27, 1889	New double stars.
5	Nov. 30, 1889	Eclipse of *Japetus*, November 1, 1889.
8	May 31, 1890	Note on photographing the dark part of the Moon.

HANS HERMAN BEHR, M.D., Professor of Botany in the College of Pharmacy.
1. Changes in the Fauna and Flora of California. *Proc. Cal. Acad. Sci.*, 2d ser., Vol. I., p. 94.
2. The Genus Neophasia. *Ibid*, Vol. II., p. 91.
3. A New Cerocampidæ. *Ibid*, Vol. II., p. 94.
4. The Economy of Nature as Exemplified by Vegetable and Animal Parasites. *Zoe*, Vol. I., p. 33; Vol. II., p. 74.

FRANKLIN BOOTH, B.S., Assistant in Metallurgy.
The Topography of Alaskan Salmon Rivers, included in the report of Dr. T. H. Bean, Icthyologist, U. S. F. C., on Alaskan Salmon Rivers, to the House of Representatives Special Committee on Fish and Fisheries. In press, 1890.

CORNELIUS BEACH BRADLEY, A.M., Associate Professor of the English Language and Literature.
Suggestions Concerning the Preparatory Course in English. *Pacific Educational Journal*, August, 1890.

SHERBURNE WESLEY BURNHAM, A.M., Astronomer.
1. Double Star Observations made at the Lick Observatory (Fourteenth Catalogue of New Double Stars). *Astronomische Nachrichten*, No. 2,875.
2. New Double Stars Discovered at the Lick Observatory. *Astronomical Journal*, Vol. VIII., p. 141.
3. Companion to *Sirius*. *Astronomische Nachrichten*, No. 2,884.
4. The Trapezium of *Orion*. *Monthly Notices, R. A. S.*, 1889, Vol. XLIX., p. 352.
5. The Double Star, *ε Hydræ*. *Sidereal Messenger*, May, 1889.
6. New Double Star, *α Ursæ Majoris*. *Astronomische Nachrichten*, No. 2,891.
7. 17 Comæ Berenices. *Observatory*, May, 1889, p. 227.
8. New Double Stars, *η Ophiuchi*, *θ Cygni*. *Astronomische Nachrichten*, No. 2,912.
9. Companion of *η Pegasi*. *Astronomische Nachrichten*, No. 2,933.
10. *Ψ Cassiopeiæ*. *Monthly Notices, R. A. S.*
11. Σ 2,400. *Observatory*, September, 1889, p. 342.
12. Double Star Observations made at the Lick Observatory from August 1, 1888, to August 1, 1889. *Proceedings A. A. A. S.*, 1889.
13. *τ Cygni*. *Knowledge*, October, 1889, p. 246.
14. The Double Star, 26 *Draconis* (*β* 962). *Sidereal Messenger*, October, 1889, p. 356.
15. Double Star Observations made with the 36-inch Refractor of the Lick Observatory (Fifteenth Catalogue of New Double Stars). *Astronomische Nachrichten*, Nos. 2,929–30.
16. Double Star Observations made at the Lick Observatory in May, June, and July, 1889 (Sixteenth Catalogue of New Double Stars). *Astronomische Nachrichten*, Nos. 2,956–7.
17. Report on the Eclipse of December 21, 1889. In *Eclipse Report*, p. 22.
18. Measures of Double Stars. *Astronomische Nachrichten*, No. 2,979.
19. Notes on the Double Stars Discovered at the Washburn Observatory. *Sidereal Messenger*, 1890.
20. Determination of the value of the micrometer screw of the 36-inch Equatorial. *Publ. A. S. P.*, No. 9, July 12, 1890.

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No.	Date.	Title of the Note.
3	July 27, 1889	New Double Stars.
4	Sept. 28, 1889	Notes on Double Stars.
8	May 31, 1890	Companion of *Sirius.*

VICTOR KING CHESNUT, B. S., Second Assistant in Chemistry.
The editorials of the *Occident*, Vol. XVIII., and contributions thereto, chiefly "locals," but including also one half of the serial article on Vacation in the Sierras.

CHARLES MILLS GAYLEY, A.B., Professor of the English Language and Literature.
1. Songs of the Yellow and Blue. Boston, 1889.
2. On the Seventh Level; A Story. *The Cosmopolitan Magazine*, May, June, July, 1889.
3. A Guide to the Literature of Æsthetics. Sacramento, 1890.

GEORGE HANSEN, Foreman of the Foothill Agricultural Experiment Station.
Illustrations in the supplement to West American Oaks.

CHARLES BARTON HILL, Assistant Astronomer, Secretary and Librarian of the Lick Observatory.
1. Map of Projection of Solar Eclipse of January 1, 1889. (MS.)
2. Observations of Comet, 1888, I. *Astronomische Nachrichten*, No. 2,877.
3. Report on the Total Solar Eclipse of January 1, 1889. In *Lick Observatory Report*, p. 74.
4. Occultation of *Jupiter*, 1889, September 3. *Astronomical Journal*, Vol. IX., p. 85.

EDWARD SINGLETON HOLDEN, LL.D., Director of the Lick Observatory, and Astronomer.
1. Hand-book of the Lick Observatory. San Francisco, June, 1888; 32°, pp. 135.
2. Stellar Photography. *Overland Monthly*, June, 1888.
3. Note on Earthquake Intensity in San Francisco, 1808–1888. *American Journal of Science*, June, 1888.
4. The Total Solar Eclipse of 1889, January 1, in California. *Monthly Notices, R. A. S.*, Vol. XLVIII.
5. Occultation of 47 Libræ by *Jupiter*, June 9, 1888. *Astronomical Journal*, Vol. VIII., p. 64.
6. The Ring Nebula in *Lyra*. *Monthly Notices, R. A. S.*, Vol. XLVIII., p. 383.
7. Regarding Sir W. Herschel's Observations of Volcanoes in the Moon. *Observatory*, 1888, p. 334.
8. Earthquakes in California, Washington, and Oregon, 1769–1888. Communicated to the *California Academy of Sciences* in July, 1888.
9. Sidereal Astronomy, Old and New; (two papers). *The Century* for August and September, 1888.
10. Occultation of a Star (11th magnitude) by *Mars*. *Astronomical Journal*, Vol. VIII., p. 102.
11. Observations of the Lunar Eclipse of July 22, 1888, at the Lick Observatory of the University of California. Communicated to the *National Academy of Sciences.* [By all the astronomers.] Printed in the report of the Total Solar Eclipse of December, 1889.
12. Suggestions for Observing the Total Eclipse of the Sun on January 1, 1889. (Printed by authority of the Regents of the University of California.) State Printing Office, Sacramento, 1888. 8vo pamphlet.
13. Hypothetical Parallax of Binary Pairs. *Sidereal Messenger*, October, 1888, p. 356.
14. Physical Observations of *Mars* during the Opposition of 1888, at the Lick Observatory. (With a plate). *Astronomical Journal*, Vol. VIII., p. 97.
14. The same. *Journal of Liverpool Astronomical Society*, Vol. VII., November, 1888, p. 7, with plates.
15. *Saturn* and his Satellites. *Sidereal Messenger*, January, 1889.
16. Observations of Nebulæ at the Lick Observatory (by E. S. Holden and J. M. Schaeberle). *Monthly Notices, R. A. S.*, Vol. XLVIII. (1888), p. 388.
17. The Lick Observatory. *The Universal Review* (London), February 15, 1889 (illustrated).
18. Earthquakes in California (1888). *American Journal of Science*, May, 1889, p. 392.
19. On the Solar Eclipse of January 1, 1889. *Observatory*, March, 1889, p. 130; May, p. 221.
20. The Lick Observatory. *Himmel und Erde* (Berlin; illustrated), May and June, 1889.
21. On the Photographs of the Corona at the Solar Eclipse of January 1, 1889. *Monthly Notices, R. A. S.*, Vol. XLIX., p. 343; *Naturwissenschaftliche Rundschau*, Vol. IV., p. 481.
22. Reported Changes in the Rings of *Saturn*. (Observations by E. S. Holden, J. M. Schaeberle, J. E. Keeler, E. E. Barnard.) *Astronomical Journal*, Vol. VIII., p. 180.
23. The Total Solar Eclipses of 1889. *The Century*, 1891.
24. Occultation of the Planet *Jupiter*, as observed at the Lick Observatory, March 23, 1889. (Observations by J. E. Keeler, E. E. Barnard, C. B. Hill, A. O. Leuschner.) *Sidereal Messenger*, May, 1889, p. 221.

25. Address before the Astronomical Society of the Pacific, "On the Work of an Astronomical Society." *Publ. A. S. P.*, No. 2, March 30, 1889.
26. Reports on the Observations of the Total Solar Eclipse of January 1, 1889. Published by the Lick Observatory, 1889. 8vo.
27. Great Telescopes and their Work. *Observatory*, March, 1889, p. 138.
28. Recent Discoveries in the Nebulæ by means of Photography. *Scientific American*, 1889.
29. On the Helical Nebulæ. *Publ. A. S. P.*, No. 3, July 27, 1889. Die Helikalischen Nebel. *Himmel und Erde*, October, 1889.
30. Astronomical Photography (two papers). *The Pacific Review*, September and October, 1889.
31. Earthquakes, and How to Measure Them. *The Century.*
32. Drawings of *Jupiter*, made with the 26-inch Equatorial at Washington in 1875. *Publ. A. S. P.*, No. 5, November 30, 1889.
33. What is the Real Shape of the Spiral Nebulæ? *The Century*, January, 1890.
34. Astronomical Observations made with the Great Telescope since June, 1888. Communicated to the A. A. A. S., 1889. [Not printed.]
35. On Photographing and Seeing Stars in the Daytime. *Astronomical Journal*, Vol. IX., p. 73.
36. Memorandum on the Determination of the Magnitudes of Stars by Means of Photography. Communicated to the permanent committee of the International Astro-Photographic Congress, August, 1889, and printed in the *Bulletin* (1890).
37. L'observatoire Lick (two papers). *L'Astronomie*, July and August, 1889.
38. The Lick Observatory Expedition to observe the Solar Eclipse of December 21, 1889. *Sidereal Messenger*, October, 1889, p. 339.
39. The Lick Observatory. In a circular of the U. S. Bureau of Education, relating to California.
40. First Annual Report of Director of Lick Observatory to the President of the University of California, September 1, 1888. (MS.) [Extracts printed as an Appendix to Report of the President, 1888.]
41. Second Annual Report of Director of Lick Observatory to the President of the University of California, September 1, 1889. (MS.)
42. On some of the features of the arrangement of stars in space. *Monthly Notices, R. A. S.*, Vol. L., p. 61.
43. The Photographic Apparatus of the Great Equatorial of the Lick Observatory. *Monthly Notices, R. A. S.*, Vol. L., p. 101.
44. The Rills of *Hyginus*, *Ariadæus*, etc., on the Moon. *Observatory*, March, 1890, p. 109; *Publ. A. S. P.*, Vol. II., p. 14; *Sirius*, April, 1890, p. 73 (with a plate).
45. Review of Montessus' Central American Earthquakes and Volcanoes (1888). *Himmel und Erde*, Vol. II. (1890).
46. Astronomical Photography at the Lick Observatory. Anthony's *International Photographic Bulletin*, 1890; also *Publ. A. S. P.*, No. 9, Vol. II., p. 152.
47. Report on the Eclipse of December 21, 1889. In the *Eclipse Report*, p. 1.
48. Address before the Astronomical Society of the Pacific, March 29, 1890. *Publ. A. S. P.*, Vol. II., p. 50.
49. Photometry of the Corona of December 21, 1889. *Publ. A. S. P.*, Vol. II., p. 69.
50. Solar Protuberances on the Negatives of the Eclipse of December, 1889. *Journal of the Italian Spectroscopic Society*, 1890, p. 95.
51. Photometry of the Corona of December, 1889. *Publ. A. S. P.*, Vol. II., p. 69.
52. Eclipse of December 21, 1889. *Publ. A. S. P.*, Vol. II., p. 93.
53. Catalogue of the Library of the Lick Observatory. In *Eclipse Report*, December, 1889, p. 1*.

The following briefer notes (among others) have been printed in the *Notices from the Lick Observatory* in the various numbers of the *Publ. A. S. P.*:

No.	Date.	Title of the Note.
3	July 27, 1889	Photograph of the Davidson Comet.
4	Sept. 28, 1889	Photographing the Milky Way.
4	Sept. 28, 1889	Examination of Stellar Photographs.
4	Sept. 28, 1889	Note on the Corona of January 1, 1889.
4	Sept. 28, 1889	Zenographical Fragments, etc.
4	Sept. 28, 1889	The uses of trails of stars in measures of position or of brightness.
5	Nov. 30, 1889	On the determination of the brightness of stars by means of photography.
5	Nov. 30, 1889	Rainfall on Mount Hamilton, 1880–1889.
6	Jan. 25, 1890	Contributions of Raphael and of Albrecht Dürer to Astronomy.
6	Jan. 25, 1890	Programme for Meridian Observations of Stars.
7	Mar. 29, 1890	International Congress of Celestial Photography.
7	Mar. 29, 1890	Earthquake Observations.
7	Mar. 29, 1890	Schiaparelli's discovery of the rotation period of *Mercury*.
8	May 31, 1890	Indexes to Scientific Periodicals.
8	May 31, 1890	Medal of the Great Comet of 1680.
8	May 31, 1890	Comet Observations at Mount Hamilton.

No.	Date.	Title of the Note.
8	May 31, 1890	New Instruments for the Lick Observatory.
8	May 31, 1890	Occultation of *Mars*, 1890, April 8.
8	May 31, 1890	Occultation of *Japetus*, 1890, April 9.
9	July 12, 1890	Notice of the life of Professor E. LOOMIS.
9	July 12, 1890	Notice of Professor DUNÉR's memoir on the Rotation of the Sun.
9	July 12, 1890	The square-shouldered aspect of *Saturn*.
9	July 12, 1890	Bands on the planet *Uranus*.
10	Sept. 13, 1890	Notice of Professor SCHIAPARELLI's memoir "On the Rotation of the planet *Venus*."
10	Sept. 13, 1890	White spots on the terminator of *Mars*.
10	Sept. 13, 1890	Photographs of *Venus* and *Mercury* in daylight.
10	Sept. 13, 1890	Photographs of *Alpha Lyræ* in daylight.

GEORGE HOLMES HOWISON, LL.D., Mills Professor of Intellectual and Moral Philosophy and Civil Polity.

1. The philosophical principles, theoretical and practical, expressed and implied, in Plato's *Apology*. In *Bulletin No. 3* of the *Philosophical Union*, Berkeley, February, 1890.
2. The probable ulterior intent of Plato's *Euthyphro*, and the real trend of its dialectic in determining the true nature of piety and impiety. In *Bulletin No. 5* of the *Philosophical Union*, Berkeley, May, 1890.
3. Philosophy and the foundations of character. Address at the meeting of the Philosophical Union, held in observance of Founder's Day of the Mills Professorship, May 26, 1890. In *Bulletin No. 6* of the *Union*, Berkeley, June, 1890.
4. The proper structure and real basis of the argument in Plato's *Phædo*, and its value; together with a review of Professor Joseph Le Conte's criticism of Plato's doctrine of the soul, and a criticism of his theory of the better doctrine afforded by the modern hypothesis of evolution. In *Bulletin No. 8* of the *Philosophical Union*, Berkeley, June, 1890.

WILLIAM CAREY JONES, A.M., Associate Professor of United States History.

Papers and References to accompany Lectures on the Formation of the Federal Constitution. Berkeley, California, 1889.

JAMES EDWARD KEELER, A.B., Astronomer.

1. The 36-inch Equatorial of the Lick Observatory. *Scientific American*, June 16, 1888.
2. Recent Astronomical Work at the Lick Observatory. *Scientific American*, November 10, 1888.
3. Observations of the Satellites of *Mars*. *Astronomical Journal*, No. 178, pp. 73–78.
4. The Appearance of *Saturn* in the 36-inch Equatorial of the Lick Observatory. *Ciel et Terre*, No. 21, January, 1889, p. 514.
5. The Outer Ring of *Saturn*. *Ciel et Terre*, No. 3, April, 1889; *Astronomical Journal*, Vol. VIII., p. 175.
6. Report on the Total Solar Eclipse of January 1, 1889. In the *Lick Observatory Report*, p. 31.
7. On the Spectra of *Saturn* and *Uranus*. *Astronomische Nachrichten*, No. 2,927.
8. Occultation of *Jupiter*, 1889, September 3. *Astronomical Journal*, Vol. IX., p. 84.
9. On the Establishment of a Standard Meridian Line for Santa Clara County, Cal. *Publ. A. S. P.*, No. 4, p. 65.
10. A new form of Electric Control for Equatorial Driving Clocks. *Publ. A. S. P.*, Vol. II., p. 3.
11. The Physical Aspect of *Jupiter* in 1889. *Himmel und Erde*, 1890. (See *Publ. A. S. P.*, Vol. II., p. 15.
12. On the Chromatic Aberration of the 36-inch Equatorial. *Publ. A. S. P.*, Vol. II., p. 160.
13. White spots on the terminator of *Mars*. *Publ. A. S. P.*, No. 10, September 13, 1890.

The following briefer notes have been printed in the *Publ. A. S. P.*:

No.	Date.	Title of the Note.
3	July 27, 1889	On Photographing the Corona in full Sunshine, etc.
3	July 27, 1889	Spectrum of DAVIDSON's Comet.
4	Sept. 28, 1889	Notes on Stellar Spectra.
7	Mar. 29, 1890	List of Earthquakes in California during 1889.
8	May 31, 1890	Notes on the Spectroscopic Apparatus of Lick Observatory.
10	Sept. 13, 1890	The Chromatic Aberration of the Pulkowa 30-inch Refractor.

WALDEMAR GOETRIK KLEE, Inspector of Agricultural Experiment Stations.

1. Insects Injurious to Fruits and Fruit Trees in the State of California. Sacramento, State Printing Office (published in December, 1888).

2. On some of our weeds, and suggestions for their destruction. Read before the State Grange in September, 1889. Published in the *Pacific Rural Press* of November, 1889.

JOHN LE CONTE, M.D., LL.D., Professor of Physics.
Noctilucous Clouds. *Nature*, October, 1889.
The Decadence of Truthfulness. *Overland Monthly*, April, 1890.

JOSEPH LE CONTE, M.D., LL.D., Professor of Geology and Natural History, and Honorary Professor of Biology in the College of Dentistry.
1. Review of Rev. Max Hark's *Unity of the Truth*. *Pop. Sci. Monthly*, September, 1888.
2. The South Revisited. *Overland Monthly*, July, 1889.
3. The general interior condition of the Earth. *Am. Geologist*, Vol. IV., p. 38 (1889).
4. The origin of normal faults, and of the structure of the basin region. *Am. Jour. Sci.*, Vol. XXXVIII., p. 257 (1889).
5. Ptomäines and Leucomäines, and their relation to disease. *Pac. Med. Jour.*, September, 1889; and *Science*, November 8, 1889.
6. Rational grounds of belief in a personal immortality. *Andover Review*, July, 1860.
7. Review of Rev. Howard MacQueary's *Evolution of Man and of Christianity*. *Overland Monthly*, July, 1890.
8. A new edition of *Evolution and its relation to Religious Thought*. 1890.
9. A new and rewritten edition of *Elements of Geology*. 1890.

ABRAHAM LEWIS LENGFELD, M.D., Professor of Materia Medica and Medical Chemistry.
The domestic adulteration of drugs. Published in *The Transactions of the Medical Society of the State of California*, 1889.

ARMIN OTTO LEUSCHNER, A.B., Instructor in Mathematics.
1. Bahn des Cometen BARNARD (Marz 31) aus Beobachtungen mit eintaegigen Zwischenzeitennach v. Oppolzer's Methode. *Astronomische Nachrichten*, No. 2,907.
2. Report on the Total Eclipse of January 1, 1889. In the *Lick Observatory Report*, p. 81.
3. Orbit of Comet BARNARD (1889, June 23). *Astronomische Nachrichten*, No. 2,909; *Astronomical Journal*, Vol. IX., p. 40; *Publ. A. S. P.*, No. 3.
4. Occultation of *Jupiter*, 1889, September 3. *Astronomical Journal*, Vol. IX., p. 86.
5. Occultation of Stars by the Moon. *Publ. A. S. P.*, No. 4, p. 70.
6. Determination of the relation between the exposure time and the consequent blackening of a photographic film. *Publ. A. S. P.*, Vol. II., p. 7.
7. Parabolic Elements of Comet SWIFT, Nov. 16, 1889. *Publ. A. S. P.*, No. 5, p. 128.
8. Elemente des Cometen BROOKS, Marz 19, 1890. *Astronomische Nachrichten*, No. 2,967; *Publ. A. S. P.*, Vol. II., p. 98.
9. On the orbit of *Mu*² *Herculis*. *Publ. A. S. P.*, Vol. II., p. 46.
10. Elements of Comet *b*, 1890, COGGIA. *Publ. A. S. P.*, No. 10.
11. Elements of Comet *c*, 1890, DENNING. *Publ. A. S. P.*, No. 10.
12. Corrigenda to v. OPPOLZER's Lehrbuch der Bahnbestimmung. *Publ. A. S. P.*, No. 10.
The following briefer notes have been printed in *Publ. A. S. P.:*

No.	Date.	Title of the Note.
8	May 31, 1890	Occultations of Stars in March and April, 1890.
9	July 12, 1890	Constants of the REPSOLD Meridian Circle, Oct., 1888, to May, 1889.

WILLIAM FLETCHER McNUTT, M.D., M.R.C.S., L.R.C.P., Professor of the Principles and Practice of Medicines.
1. Mineral and Thermal Springs of California. Prepared for the Ninth International Medical Congress.
2. Clinical Medicine, including Diagnostics and Therapeutics. Prepared for Medical Society, State of California.
3. Malignant disease of the Uterus, with a report of the removal of five cases, all recovered.
4. Who are the Regulars? Communication to the *Occidental Medical Times*, Sacramento.

DOUGLASS WILLIAM MONTGOMERY, M.D., Professor of Histology and Pathology, Member of the Dispensary Staff, and Curator of the Medical Department.
1. Gangrène Gaseuse Foudroyante.
2. Histological and Bacteriological Examination of a piece of Leprous Skin from the arm of Keanu, inoculated with leprosy in 1885.
3. A case of Cancer of the Duodenum.

BERNARD MOSES, Ph.D., Professor of History and Political Economy.
1. The establishment of Municipal Government in San Francisco. *Johns Hopkins University Studies in Historical and Political Science*, seventh series, II.–III., Baltimore, 1889.
2. The Federal Government of Switzerland; an essay on the Constitution. Oakland, California, 1889.

FÉLICIEN VICTOR PAGET, Bacheliér ès Lettres, Bacheliér ès Sciences, Assistant Professor of the French and Spanish Languages.
1. Notes on the Travailleurs de la Mer of Victor Hugo, by Edward T. Owen, Professor

of the French Language and Literature in the University of Wisconsin, and Félicien V. Paget, of the University of California, 1888.

2. Notes on the Ursule Mirouet of H. de Balzac, by Félicien V. Paget, of the University of California, and Edward T. Owen, Professor of the French Language and Literature in the University of Wisconsin, 1889.

LOUIS PAPARELLI, First Assistant in the Viticultural Laboratory.

1. Etude Chimique sur l'Olivier. (Montpellier, France). Translated by the California State Board of Horticulture, and printed in its report for 1889.
2. Trattate di Chimica Analitica applicata all'agricoltura del Prof. L. Grandeau. First Italian translation by L. Paparelli. Florence, Italy.
3. The Value of Cultivated Mushrooms as Food. *Press and Horticulturist*, November 9, 1889.
4. Cream of Tartar. *Vitigraph*, Nos. 2 and 3, January, 1890.
5. Caractères d'une Nouvelle Maladie de la Vigne en Californie. *Lyon Vinicole*, March 2, 1890.
6. How to Tell Adulterated Oil. *California*, April 19, 1890.
7. L'enseignement Agricole en Californie. *Lyon Vinicole*, May, 1890.
8. Oenotannin versus Plastering. *Pacific Coast Rural Press*, and others, May, 1890.
9. Manufacture of Cream of Tartar and Tartaric Acid, from Grape Pomace and Wine Lees. Oakland.

WILLIAM GALT RAYMOND, C.E., Instructor in Civil Engineering.

1. Topographic Modeling. *Engineering News*, New York, February 23, 1889.
2. A Graphic Method for Estimating Earthwork. *Trans. Tech. Soc. P. C.*, December, 1889.
3. What Constitutes a Map. *Trans. Tech. Soc. P. C.*, January, 1890.

JOHN JAMES RIVERS, Curator of the University Museum.

1. Doings of Agrotis Cupidissima Crote. *Insect Life*, Vol. II., August, 1889.
2. Description of a New Turtle from the Sacramento River, belonging to the family of Trionychidæ. *Proc. Cal. Acad. Sci.*, Vol. II., 1889, pp. 233–236.
3. Notes upon the Habits of Pleocoma. *Entomologica Americana*, Vol. V., 1890.
4. A New Pleocoma. *Entomologica Americana*, Vol. V., January, 1890.
5. Habits of Pleocoma Behrensii. *Zoe*, Vol. I., p. 24, March, 1890.
6. The Argynnides of North America. *Psyche*, Vol. V., April, 1890.
7. Description of a new Cychrus. *Entomologica Americana*, Vol. VI., p. 71, 1890.
8. A famous Manzanita. *Pacific Rural Press*, May 24, 1890. (Large plate.)
9. New North American Coleoptera of the genera Amblychila, Cychrus, and Necydalis.

JOSEPH CUMMINGS ROWELL, A.B., Librarian of the University.

Library of the University of California. Contents-Index, Vol. I. Berkeley, 1889–90. 8vo. 519 pages.

JOHN MARTIN SCHAEBERLE, C.E., Astronomer.

1. Elements and Ephemeris of Barnard's Comet *e*, 1888. *Astronomical Journal*, Vol. VIII., p. 102; *Sidereal Messenger*, October, 1888, p. 357. Communicated to the *California Academy of Sciences*.
2. Orbit and Proper Motion of 85 Pegasi (β 733). *Astronomical Journal*, Vol. VIII., p. 129. Communicated to the *California Academy of Sciences*.
3. Elements and Ephemeris of Barnard's Comet *f*, 1888. *Astronomical Journal*, Vol. VIII., p. 144; *Sidereal Messenger*, December, 1888. Communicated to the *California Academy of Sciences*.
4. Observations of Nebulæ at the Lick Observatory (by E. S. Holden and J. M. Schaeberle). *Monthly Notices, R. A. S.*, Vol. XLVIII. (1888), p. 388.
5. Meridian Observations of Polyhymnia and Harmonia. *Astronomische Nachrichten*, No. 2,877.
6. Corrections to the Lick Observatory Time Signals for December 30.0, December 31.0, January 1.0 and January 2.0. *Astronomical Journal*, Vol. VIII., p. 168.
7. Elements and Ephemeris of Barnard's Comet (March 31). Communicated to the *California Academy of Sciences;* telegraphed to *Astronomical Journal*, and printed in Vol. VIII., pp. 183 and 191; *Astronomische Nachrichten*, No. 2,889. (See, also, *Astronomische Nachrichten*, No. 2,903.)
8. Report on the Solar Eclipse of January 1, 1889. In *Lick Observatory Report*, p. 23.
9. On the Photographic Brightness of the Fixed Stars. *Publ. A. S. P.*, No. 4, September 28, 1889; translation printed in *Bulletin* of the International Astro-Photographic Congress 1890, part 5, page 302.
10. Observations of the Transit of *Venus*, December 5–6, 1882. *Astronomische Nachrichten*, No. 2970.
11. A Mechanical Theory of the Solar Corona. *Publ. A. S. P.*, No. 7; *Monthly Notices, R. A. S.*, Vol. L., p. 372.
12. Report on the Eclipse of December 21, 1889. In *L. O. Eclipse Report*, p. 22.

The following briefer notes have been printed in the *Publ. A. S. P.*:

No.	Date.	Title of the Note.
3	July 27, 1889	Meridian Circle observations of *Victoria* and comparison stars.
8	May 31, 1890	Occultation of *Mars*, 1890, April 8.
9	July 12, 1890	Bands on the planet *Uranus*.
10	Sept. 13, 1890	White spots on the terminator of *Mars*.

JOACHIM HENRY SENGER, Ph.D., Instructor in German and Greek.
1. Willful Disobedience. *Pacific Ed. Journal*, December, 1888.
2. Philosophical Acumen. *The Nation*, N. Y., February, 1889.
3. The Fundamental Definitions of Geometry. *Pacific Ed. Journal*, December, 1889.
4. Heinrich Heine's Harzreise. *Modern Lang. Notes*, May, 1890.

GUSTAVUS CROCKER SIMMONS, M.D., Lecturer on Therapeutics.
Articles in *The Occidental Medical Times*, published monthly in Sacramento, including medical letters from Panama, from Berlin, from Munich, from Vienna, from Paris; also, translation of Virchow's *Eine Reise nach Aegyptian* (*A Journey to Egypt*); and departmental contributions on venereal and skin diseases.

ADOLPH SOMMER, Ph.G., Assistant in Chemistry:
1. United States Patent No. 389,020, for a process of making neutral compounds of chloride of sulphur.
2. United States Patent No. 389,021, for compounds of tallow and chloride of sulphur.
3. United States Patent No. 396,774, for a paint oil.
4. United States Patent No. 408,360, for a waterproof leather and process of making the same.
5. United States Patent No. 410,940, for solutions of benzoic sulphide in oils, fats, waxes, resins, paraffins.
6. United States Patent No. 416,760, for extinguishing mercury.
7. United States Patent No. 419,726, for neutralizing sulphochlorinated organic compounds.
8. British Patent No. 12,795, for the manufacture and application of compounds of chloride of sulphur with fatty bodies.
9. Canadian Patent No. 33,618, for lubricants and paint oils.
10. Canadian Patent No. 33,576, for compounds of chloride of sulphur with fatty bodies.
11. Canadian Patent No. 33,619, for waterproofing and preserving leather and hide.
12. Belgian Patent No. 83,139, for améliorations dans la fabrication et l'application des composés du chlorure de soufre avec les corps gras.
13. German Patent No. 50,282, for Verfahren der Darstellung von haltbaren neutralen Verbindungen aus Fettkoerpern und Chlorschwefel.
14. German Patent No. 50,544, for Verbesserung in dem Emulgiren des Quecksilbers.
15. German Patent No. 50,543, for Verfahren zur Darstellung von Verbindungen aus Chlorschwefel und festen Fettkoerpern.
16. German Patent No. 52,166, for Neuerung an Schmiermitteln.
17. Austrian Patent Nos. 24,316, 29,485, for Verbesserungen in der Darstellung und Anwendung der Verbindungen des Chlorschwefels mit Fettkoerpern.
18. French Patent No. 192,770, for la fabrication et l'application des composés du chlorure de soufre avec les corps gras.

IRVING STRINGHAM, Ph.D., Professor of Mathematics.
1. On the Criterion of Continuity of Functions of a Real Variable, and on the Theorem of Mean Value. *Publications of the Astronomical Society of the Pacific*, Vol. II., 1890.
2. On Hyperbo-Elliptic Functions. *Publications of the Astronomical Society of the Pacific*, Vol. II., 1890.
3. On Napier's Definition of a Logarithm and its Consequences. *Transactions of the Technical Society of the Pacific*, Vol. VII., 1890.

WILLIAM THEODORE WENZELL, M.D., Pharm.M., Professor of Chemistry in the College of Pharmacy.
1. A contribution to the knowledge of the coloring principles of flowers. *Proceedings of Am. Pharm. Assoc.*, 1889, p. 244.
2. On the Expansion of Fixed Oils. *Proceedings of Cal. Pharm. Society*, 1888–9, p. 34.

EDWARD JAMES WICKSON, A.M., Lecturer on Practical Agriculture, and Assistant Superintendent of the Experimental Grounds.
1. The Vacaville Early Fruit District. 8vo, 100 pp., 12 colored plates. Published by California View Company, San Francisco, 1888.
2. California Fruits and How to Grow Them. Large 8vo, 575 pp., fully illustrated. Published by Dewey & Co., San Francisco, 1889.

FINANCIAL STATEMENT.

NOTE.—The Act of the Legislature of the State of California, entitled "An Act to provide for the permanent support and improvement of the University of California by the levy of a rate of taxation and the creation of a fund therefor," approved February 14, 1887, contains the following provision:

Section 5. The money derived from said fund must be applied only to the support and permanent improvement of the University, and the Board of Regents must include in its biennial report to the Governor a statement of the manner and for what purposes the money was expended.

The following statement shows in outline the manner and purposes of the expenditures of the State University Fund for the fiscal years 1888–89 and 1889–90.

Statements showing these expenditures in detail are given on pages 212–271 of the Annual Report of the Secretary of the Board of Regents for the year ending June 30, 1890, a copy of which is sent herewith. The page references noted below are to that report:

RECEIPTS.

	1888–89.	1889–90.
Cash on Controller's warrants, pp. 212, 251	$92,385 74	$101,205 89

DISBURSEMENTS.

	1888–89.	1889–90.
Advertising and printing, p. 269		$301 80
College celebrations, pp. 249, 270–271	$320 25	234 70
College of Chemistry, pp. 212–226	4,647 75	
College of Civil Engineering, pp. 245–246, 261	10,803 35	11,836 88
Equipment and repairs, pp. 236–240, 263–268	4,067 16	6,087 10
Fuel and gas, pp. 249, 271	766 77	973 57
Incidental expenses, p. 270		72 35
Insurance, pp. 250, 271	7,327 75	4,323 30
Land administration, p. 270		469 73
Library, pp. 240–242, 258–259	4,010 97	2,469 69
Lick Observatory, pp. 226–233, 251–256	15,821 12	4,580 77
College of Mechanics, p. 262		13,001 16
Department of Mineralogy, pp. 247–248, 261	248 63	273 16
College of Mines, pp. 244–245, 263	8,538 70	9,300 25
Museum, p. 246	1,387 72	
Official and lecturing expenses, pp. 249, 270	737 39	982 00
Physical Culture, pp. 242–244, 256–258	3,259 13	4,653 93
Department of Physics, pp. 248–249, 260	417 06	416 80
Postage, pp. 249, 271	756 00	482 00
Salaries, p. 271		10,223 99
Stationery, pp. 249, 270	291 63	257 55
Telegraphing and expressage, pp. 250, 269–270	9 82	492 33
University Printing Office, pp. 245, 260–261	1,443 59	1,444 45
University site improvements, pp. 233–235, 259–260	5,967 20	2,981 65
Water supply, pp. 235–236, 268–269	6,563 75	346 69
Totals	$77,385 74	$76,205 85

AMOUNT RESERVED FOR PERMANENT IMPROVEMENTS.

	1888–89.	1889–90.
Reserved for permanent improvements	$15,000 00	$25,000 00

UNIVERSITY OF CALIFORNIA.

BIENNIAL REPORT

OF THE

PRESIDENT OF THE UNIVERSITY

ON BEHALF OF THE BOARD OF REGENTS,

TO

HIS EXCELLENCY THE GOVERNOR OF THE STATE.

1893.

SACRAMENTO:
STATE OFFICE, : : : : : A. J. JOHNSTON, SUPT. STATE PRINTING.
1894.

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REPORT OF THE PRESIDENT.

To His Excellency H. H. Markham, *Governor of the State of California:*

Sir: The last Biennial Report of the Regents of the University, prepared by President Horace Davis, was published in 1890. In 1892 there was no President to assume this duty; and thus it happens that the present report is for three years instead of two. During these years the University has made gratifying progress.

The following table shows the number of students in attendance in the various departments of the University, for the years 1890–91, 1891–92, 1892–93, and for the beginning of the year 1893–94:

	1890–91.	1891–92.	1892–93.	1893–94. (1st Term.)
In Academic Departments at Berkeley:				
Young men	352	383	446	526
Young women	105	164	204	250
Totals	457	547	650	776
At the Lick Observatory (men)	3	4	6	4
In the Colleges of Law, Medicine,* Pharmacy, and Dentistry, in San Francisco:				
Young men	302	378	415	454
Young women	9	12	20	23
Totals	311	390	435	477
Total in the University	771	941	1,091	1,257

* Including the Post Graduate Medical Department.

There are, in addition to the students here enumerated, 21 young men and 70 young women enrolled in the recently affiliated Mark Hopkins Institute of Art.

The numbers graduated in connection with the several Colleges during the past three years are as follows:

		College of Letters. (3 Courses.)	Colleges of Applied Science.	Law	Medicine	Pharmacy	Dentistry	Totals
In 1891.	Men	32	18	21	20	33	23	147
	Women	6	------	------	1	------	1	8
	Totals	38	18	21	21	33	24	155
In 1892.	Men	30	15	16	12	32	†	105
	Women	18	2	------	2	1	------	23
	Totals	48	17	16	14	33	------	128
In 1893.	Men	34	21	23	20	30	28	156
	Women	17*	2	------	2	------	------	21
	Totals	51	23	23	22	30	28	177

* This includes one degree of B.L. granted by recommendation of the newly organized College of Social Sciences.

† The College of Dentistry held no Commencement in 1892.

In addition to the degrees here enumerated, all of which were conferred in course, the Board of Regents, on May 16, 1893, conferred the honorary degree of Sc.D. on James Edward Keeler, A.B., and Ladislas Weinek, Ph.D.

In all college courses in the United States, a very considerable percentage of matriculants fail to graduate. The falling off is greater in the newer communities: by reason of the less stable conditions of society, the temptations to go into business, and the great impatience of those who are looking toward a professional career.

The increase in the number of students, and the inevitable expansion of the courses, have necessitated a considerable increase of the teaching force. The entering class this year at Berkeley overcrowded the class-rooms, and compelled a further subdivision of the sections. The increase in the teaching staff at Berkeley is shown in the following table:

Table showing the Number of Professors, Associate Professors, Assistant Professors, Lecturers, Instructors, Assistants, and Fellows in the Colleges at Berkeley during Each Academic Year—Compiled from the Annual Registers.

Year.	Professors.	Associate Professors.	Assistant Professors.	Lecturers.	Instructors.	Assistants.	Fellows	Totals.
1890–91	17	5	5	2	8	11	--------	48
1891–92	17	8	8	--------	13	12	2	60
1892–93	16	9	10	1	19	18	4	77
1893–94 (first term)	16	9	12	--------	20	14	7	78

Leave of absence, with salary continued, was granted in 1890–91 to Professor Moses; in 1891–92 to Professor Le Conte; in 1892–93 to Professor Hilgard and Associate Professor Jones. No one is absent for 1893–94. It is a question whether the Board of Regents should not modify its procedure in granting such leaves of absence, so as to give leave with half pay after a certain term of service. This plan is in successful operation at a few leading universities. It has the advantage of permitting a year's study elsewhere to two professors in place of one, and of encouraging such study by younger men, whose increased power may afterward be of longer service to the University. It is certainly wise to afford our professors such opportunities, and more important to them because of their less frequent intercourse with Eastern faculties, and their distance from the meeting places of the various national associations.

President Horace Davis resigned his office in 1890. The *locum tenens*, from September, 1890, to January 24, 1893, was the present incumbent, who was formally inducted into office on Charter Day, March 23, 1893.

April 29, 1891, the University lost by death one of its first appointed professors, John Le Conte, M.D., LL.D., Professor of Physics, and ex-President of the University; a man loved and venerated alike by the Faculty and students, and noted for his great scientific attainments. He helped to shape the work of the University at the outset, was Acting President at different times, and President from 1876 to 1881. Notices of his life and work have been published in various periodicals, and in a monograph prepared by a committee of the Faculty. A fuller account of his early environment and his scientific work, prepared by his brother, Professor Joseph Le Conte, will soon be published by the National Academy of Sciences.

Many departments of instruction have been materially strengthened. In the Department of Modern Languages, Italian has been added. Pedagogy and Biology had no footing in 1890; now the one is well organized, and the other is enlisting the interest of an increasing number of students. The Astronomical courses at Berkeley, under the general charge of Professor Soulé, have been assigned to Assistant Professor Leuschner, whose full time is needed for class-room and observatory work with the increasing numbers in that department. Lectures are promised from our own astronomers at the Lick Observatory, and from others.

It is most desirable to organize, in connection with Astronomy, a Department of Meteorology, to study the climatic phenomena of California. Plans for such a department have already been matured, and appeal strongly to the commercial and agricultural interests of our State.

In San Francisco, the newly organized San Francisco Polyclinic forms a Graduate Medical Department of the University, offering facilities for practice in several of the largest hospitals.

The accommodations for instruction have been materially enlarged during the last three years. The Chemical Laboratory, erected in 1889 at a cost of $60,000, has been equipped and occupied. A new Mechanical and Electrical Building approaches completion, at a cost of nearly $70,000; $30,000 has been assigned this year for equipping the building, leaving a still larger amount to be provided for another year. Over $20,000 has been set aside for the immediate erection of a permanent plant-house for the College of Agriculture. A new Botanical Garden is already laid out and fairly well stocked. A considerable addition has been made to the Harmon Gymnasium. In the Department of Physical Culture, however, a separate building and additional instruction for the young women are very much needed.

A most valuable addition to the provisions for the students' comfort has been made by Mrs. A. J. Stiles, a generous-hearted resident of Berkeley. At a cost of over $30,000, she has erected, just outside of the principal entrance to the University grounds, a handsome and commodious building for the use of the Christian associations and various other student organizations. As a social center, Stiles Hall has already become an important part of the University equipment.

The professional colleges in San Francisco are still suffering for want of suitable accommodations. The Colleges of Dentistry and Pharmacy are better housed and equipped than three years ago, but ask for ampler rooms. The Hastings College of the Law remains with unsatisfactory accommodations, and the Medical Department is suffering increased loss from its inadequate and out-of-the-way quarters. It is much to be regretted that financial limitations defeated the bills passed by two Legislatures to give a common home to these professional colleges with an economical adjustment of equipment and facilities. (See subjoined reports from Professional Colleges.)

During the past year the University has acquired a new home for art in San Francisco, through the gift of Mr. Edward F. Searles. The magnificent house erected by Mark Hopkins has been transferred to the University for use as the Mark Hopkins Institute of Art. The San Francisco Art Association has charge of the building, and in addition to its free use, receives further aid from Mr. Searles. This benefaction to San Francisco, and to the whole State, opens a new door of education, and gives promise of a strong, helpful influence on the side of a refining culture.

The Harvard Club, of San Francisco, has continued its scholarship (of not less than $200) annually since 1887. Mrs. Phebe A. Hearst has established scholarships for young women, as follows: five on September 28, 1891; three on April 12, 1892. Each one is of the value of $300 a year. The pressing applications for aid from this source are much more numerous than the scholarships. The Hinckley scholarship of $300, awarded by the trustees of the William and Alice Hinckley Fund to "some young man in the University of the State, or in some other school," has been awarded each year since its foundation, *i. e.*, since the beginning of the academic year 1891–92, to some student of this University. Important gifts by D. O. Mills, Esq., Mrs. Hearst, Regent Crocker, and others, to the Lick Observatory, are described and acknowledged at length in the annual reports of the Secretary of the University, and of the Director of the Observatory. (See subjoined report of Director Holden.) In the Secretary's reports are complete lists of donations to the General Library of the University, and to the Museum.

The details of instruction at Berkeley are similar to those which were given in the last Biennial Report. We have a faithful corps of teachers, whose methods of instruction and widening courses of study are constantly becoming more valuable, keeping pace with the progress apparent in the best American universities. There has been a large addition to the number of courses offered. In 1890–91, the total number of courses offered was 161; in 1891–2, 195; in 1892–3, 229; in 1893–4 (first term), 261. With the stimulus of a growing attendance, the addition of new facilities, and a more elastic choice of courses and studies, the work of the University has gone forward with an increasing momentum.

The following points are noteworthy in connection with the reports of the various departments:

The work of the Agricultural Department in the Farmers' Institutes has continued to be fruitful. It is an important phase of University Extension. The correspondence of the department is very extensive, giving information and advice in response to inquiries from all parts of the State. The analysts in its laboratories are kept busy with the numerous calls for their service.

The classes in Entomology, under the care of Assistant Professor Woodworth, have been largely attended.

The Experiment Stations have been vigorously maintained. At the last session of the Legislature the Forestry Stations heretofore supported by the State were turned over to this department, but the funds granted for their equipment and maintenance have proved quite inadequate.

The College of Agriculture gives instruction to many students from our other colleges. The number of students on its list is not fairly compared with the numbers in agricultural colleges which have an independent existence. In those colleges there is always a compound curriculum, including many branches, such as English, French, German, Economics, and Zoölogy, which with us are taught in the other colleges, and attracting students who desire a general education. Here the purely agricultural courses are quite as fully provided for as in any of the segregated institutions; and the students taking those courses have the advantage of contact with a larger Faculty, and of a larger student fellowship. The outside work of this college is of still greater value than that which is done with its students. Its bulletins give much information to the farmers of this State, whose soils and productions are so various, and are exchanged with those of other agricultural colleges throughout the country. This department can organize short courses for special studies, whenever there shall be a sufficient call for them. There is no one favorable time of the year, like the winter of colder States, when farmers can be spared from their homes. But some respite from work seems possible, on the part of enough to form several classes, say for a month or six weeks, with decided benefit to the students.

The College of Mechanics is about to be transferred to the very commodious building erected for its use. There will be especial facilities for the study of Electrical Engineering. Assistant Professor Cory, a graduate of Cornell University, has been added to the staff of instruction.

The College of Civil Engineering is now, after many years cramping, to find larger quarters in the building left by the College of Mechanics, where the value of its work can be much increased. The professor in charge reports an increase in the number of courses offered. He is anxious to obtain an assistant who can give instruction in Architecture. Much of the instruction needed for that study is already furnished, and a considerable number of students are waiting for the full establishment of this course. I regard Professor Soulé's recommendation as worthy of immediate attention.

The College of Mining has organized a laboratory course in practical mining. Summer excursions for the study of practical mining were begun in 1892, taking the students through some of the principal mining counties.

The College of Chemistry has for several years conducted a summer school in its new quarters. The attendance is large and increasing. This, as the department claims, is really a part of our University Extension work, affording opportunities to many school teachers, which they can enjoy only during their summer vacation. Professor Rising deems it very desirable that students enter college with a knowledge of Elementary Chemistry.

The Department of Physics, also, has organized a summer school, with like benefits to teachers in the schools, especially the high schools. Here they learn how to conduct the laboratory work, which is now expected of all the high schools. The laboratory work in Physics has increased five-fold since 1890. Associate Professor Whiting has been added to the teaching staff, with one or two new assistants, but the work in prospect for the next year demands a still larger force.

Last summer a school in Marine Biology was conducted by Assistant Professor Ritter at Santa Catalina Island. Professor E. B. Wilson, of Columbia College, New York, rendered very valuable service during many weeks. Professor Ritter desires leave of absence for a year, to pursue important investigations with the aid of European libraries and biological facilities.

Professor Joseph Le Conte returned from his year's absence in the summer of 1892. At Washington, in that year, he was elected President of the American Association for the Advancement of Science. His address, as retiring President, was given last summer in Madison. He has resumed his lectures in Geology and Zoölogy, but asks for assistance in the wide field assigned him. The Department of Zoölogy may properly be combined with the biological work already organized. It is desirable that there should be an assistant in Palæontology under Associate Professor Lawson's direction. A valuable field map of the region around San Francisco has been prepared by the Geological Department. (See report of the Dean.)

In the Department of Botany much good work has been done with the students, and still more in classification and correspondence. In 1892, at the World's Congress of Botanists held in Genoa, Professor Greene was named a member of the International Committee on Botanical Nomenclature—one of three members from the United States. He was President of the Botanical Congress held in connection with our Columbian Exposition at Madison, Wisconsin.

The Mathematical Department, having affiliations with all the colleges, has naturally shared in the general growth of the University. Its teaching staff has been increased, but is still too small for the needs and aims of the department. Its graduate work is of growing importance, and the advanced undergraduate studies are of a high character.

The work in ancient languages has expanded, especially in Latin. Preparatory Latin will henceforth be required for two of the three colleges of general culture, and strongly recommended in the third. Besides the prescription of a year for the Classical Course, the study will probably be continued by an increasing number from other colleges. There has been a very rapid growth in the Department of French and other Romance languages. The German classes have continued to increase in numbers. It is important that instruction in these two modern languages should, as soon as practicable, be fully organized in all the preparatory schools. University work in these, as in the ancient languages, should be on advanced lines of study.

None of the departments has developed more rapidly than that of the English language. It offers one half more courses than in 1890, and is doing much in our University Extension work. The number of teachers is also increased by one half. Associate Professor Bradley has spent one of the three years in study at Berlin, at his own charges.

The Department of History and Political Science maintains the high rank which it has long held. Its courses are more numerous and of a wider range than ever before. Its large classes call for still further additions to the staff of instruction, especially in the subjects of Finance and Social Economics. Since Associate Professor Jones returned from his year abroad, he has given his whole time to the Department of Jurisprudence, a department which is growing in importance, and proving a valuable adjunct to the courses in the Hastings College of the Law.

The Mills Professorship of Intellectual and Moral Philosophy and Civil Polity has continued to draw many students to its classes. It has been strengthened by the accession of an Instructor and two Fellows. Professor Howison now asks for an Associate Professor of Experimental Psychology, with a well-equipped laboratory. The importance of this branch of psychological study is recognized in the leading universities of the country.

The report from the Department of Pedagogy shows good progress for the brief time since it was established. Much of the work of the Professor in charge must be done outside, in aiding the teachers of the State at their Institutes and Associations. The field is so large that there is already need of further assistance in instruction and in responding to outside calls. The department thus far has an insufficient equipment in books.

The Library mourns the loss by death of Miss Harriet E. Green, who had been but one year in its service; a most accomplished and faithful member of the new and important profession of trained libratural community, to satisfy the public with a narrow agricultural course. So sure is it that the farmers themselves are responsible for the failure to bring out a large number of thoroughly equipped graduates in agriculture.

It may be worth while in this connection to refer to the language of the Congressional Act "donating public lands to States and Territories which may provide Colleges for the benefit of agriculture and the mechanic arts": the donation is to be devoted to the "endowment, support and maintenance of at least one College, where the leading object shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, in such manner as the Legislatures of the States may respectively prescribe, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life."

The accrediting system has been continued with manifest advantage to the Preparatory Schools and to the University. In the year 1894–95 the usual appropriation was made for the expenses of visiting examiners. In 1895 the Regents sought to economize by cutting off this appropriation. It was thought that the work might be allowed to lapse for a single year. But numerous protests came from all parts of the State, affirming the great advantage to the schools of the accrediting system, and the harm which would ensue from a single year's cessation. It was strongly averred that this connection of the University with the High Schools had been of the greatest service to the schools. Influenced by these calls, the Regents at last made half the usual appropriation, which was used to the best of their ability by five of the leading departments in the University. The number of accredited schools in 1894 was 48; in 1895, 57; in 1896, 67, of which 52 are public High Schools in all parts of the State.

The time has come to have a clear understanding of the relations involved in this accrediting system. They seem simple enough, but in certain quarters they have been objected to as bringing an arbitrary power to bear on the schools and on individuals.

Accrediting was first introduced here in imitation of the system employed at the University of Michigan. But it was made more thorough in its working, by commissioning a larger corps of examiners. We send out experts in all the leading subjects required for entrance to the College classes. We accredit the school only in those branches in which it makes a satisfactory showing. In addition to the school diploma, we require the personal recommendation of the Principal of the school. When these conditions are met, the students from accepted schools come in without examination in all the accredited branches of study.

Accrediting is entirely voluntary on the part of the schools. The

University sends its examiners only in response to a request from the schools. It is simply, first, an offer of help to the schools, in determining the probable standing of a school in comparison with the other schools of the State; and, secondly, a privilege granted to the graduates of the schools, of coming in without examination at the University. This privilege is greatly prized, and of course it exerts an influence in favor of accrediting. But it must be repeated, that the University itself brings no sort of pressure to bear on any school for becoming accredited. The almost universal request for accrediting arises from the manifest advantages of the system; a system which has now found wide favor throughout the land, and has been adopted (in a less perfect form than our own) in some of the oldest Eastern colleges.

We do not claim that our decisions as to accrediting are infallible. If we err, it is probably on the side of a negative conservatism. We regard the concession as one to be granted cautiously, and where it is not likely to be soon forfeited. In addition to the visits of the examiners, two additional safeguards are resorted to: specimen papers of the regular work of the school; and (after accrediting) a record of the early college work of recommended students. The University has no private ends to gain in all this procedure, it has no personal grudge to gratify. If its decisions affect individuals unpleasantly, it is only incidental to the working of a system which must have less regard to individuals than to the larger interests of the school system of our State. We must insist on a proper University standing, such as is maintained by other first-class Universities; and we cannot maintain such a standard without fit preparation on the part of all incoming students.

As the schools multiply, it becomes a question whether the increasing burden of the examiners' traveling expenses should be borne by the University alone out of its all too scanty general fund. The work is preëminently one for the benefit of the High Schools, as a part of the State system of education.

Professor Joseph Le Conte has taken a half-year's leave of absence, to attend various meetings of Scientific Associations in this country and Great Britain. He will give the President's address before the American Geological Society. He will also represent us at the Princeton celebration in commemoration of the founding of the College of New Jersey, one hundred and fifty years ago. On his return, Dr. Le Conte will devote much of his time to graduate instruction, and hand over to Associate Professors the chief portion of his undergraduate work.

Assistant Professor Leuschner is to be absent for a year, on half-pay. For several years the Board of Regents has been inclined to adopt the Harvard and Cornell plan of a "Sabbatical year," by which a professor, after six years of work, gains a year off with half-pay, for study elsewhere. It is thought very desirable that University men take such

Entrance Examinations.

Places.	Number of Applicants.			
	Matriculation.	Preliminary.	Law.	Totals.
In June, 1891:				
Berkeley	108	1	13	122
Los Angeles	12	0	0	12
Grass Valley	2	0	0	2
Chico	0	0	0	0
Visalia	0	0	0	0
Totals	122	1	13	136
In June, 1892:				
Berkeley	59	4	16	79
Los Angeles	8	0	0	8
Grass Valley	3	0	0	3
Chico	0	0	0	0
Visalia	0	0	0	0
Totals	70	4	16	90
In May, 1893:				
Berkeley	112	3	9	124
Los Angeles	15	1	0	16
Grass Valley	1	1	2	4
Chico	1	0	0	1
Visalia	0	0	0	0
Totals	129	5	11	145

At the second entrance examination held at Berkeley each year, there were, in addition to the applications enumerated above, new applications, as follows: In September, 1891, 35; in August, 1892, 34; in August, 1893, 61. The falling off in the number taking entrance examinations in 1892–93 was counterbalanced by an increase in the number who presented recommendations from accredited schools. The number of such recommendations filed in 1891–92 was 113; in 1892–93, 160; in 1893–94 (first term), 173. Many applicants who hold recommendations from accredited schools find it necessary to appear for examination in one or more subjects in which recommendation has been withheld by their Principals.

The Regents have set aside a fund for University publications in the nature of contributions to science and literature. Several important monographs have thus appeared during the past year; of which may be noted an extended dissertation on the uses of the Greek verb, by Professor Flagg, and Notes on the Development of a Child, by Miss M. W. Shinn, candidate for an advanced degree.

Other publications have appeared independently of the above fund. In the Botanical Department a journal has been published for several years, the expense being assumed by Professor Greene. Professor Stringham has issued an important work on his own account. The Geological Department is printing a series of papers, to be made into a separate volume, for the issue of which it assumes the responsibility. Several of the Professors and Instructors have done valuable work in book-making. A list of the published writings of our University teachers, during the few years past, will be found in the Appendix.

The University is largely dependent for its good name and its usefulness on the spirit and conduct of its body of students. It would be unjust to our students to omit from this report a notice of their commendable bearing during the three years under review. Good order has prevailed; high motives have been in the ascendant; there has been a spirit of genuine loyalty to the University. The instructors have found in all the class-rooms eager and earnest learners. A very large majority of the students take a just pride in the performance of their University duties. There is no taint of false aristocracy which mars their fellowship. Almost all are looking forward to laborious careers; many of the most influential are now dependent on self-help. It would be well if there were a more pronounced center of student life for the hours not spent in the class-rooms. A dormitory supplying homes for a goodly number on the University grounds would render their comradeship more intimate and helpful, and increase indefinitely the *esprit de corps.* A University restaurant has been an acknowledged want, and members of the Faculty and representative students have formed an association to supply the want, using one of the cottages on the ground.

The full account of the finances of the University will be found in last year's report by Secretary Bonté. This includes a list of the land grants from the General Government, and a statement of patents issued by the University up to June 30, 1892. The land agency is combined with the Secretary's office. Herewith are submitted various University documents, showing the conduct of the institution in its most recent procedure.

It seemed incumbent on the University to contribute its share of interest to the Midwinter Fair in San Francisco, and to show the people of the State, to some extent, what is done in their highest institution of learning. The different departments of instruction are to furnish specimens of their equipment and work, or photographs of their appliances for study, or charts of their courses and systematic procedure. The Professional Colleges will take part in this exhibition, and the Lick Observatory will contribute very valuable material. It is confidently expected that our display will do the University credit.

The University of California is already a large and comprehensive institution. In its Academic and Professional departments it has to care for more than 1,200 students; 800 of these receive free instruction at Berkeley. The wide range of the studies pursued, the cost of elaborate scientific appliances, the increased specialization in the higher work, the expenses incurred in caring for the property and improving the premises, all indicate the need of a large outlay in supporting and developing a university of the first class. Aside from the miscellaneous items of the yearly budget, the two great demands are, first, a larger salary roll for instruction, and secondly, increased resources for new buildings.

The need of an increased salary roll results from the increased specialization of university work, and from the growth of the classes in all the departments. The number of students at Berkeley, as heretofore shown, is 90 per cent greater than in 1889–90. The best men in the Faculties must be retained by promotion. The highest salaries paid to our professors are moderate in comparison with salaries paid in some other universities, and scanty indeed as compared with the rewards of the successful merchant or lawyer. Our young men in instructorships could easily procure a better support in other occupations, or even in the high schools and grammar schools of our State. We cannot advance them all to high positions. Many instructors must come and go. But the more important work of the University claims the best ability within our reach, and the men competent to perform that work cannot be spared without detriment to all University interests. New endowments, such as those of D. O. Mills and Edward Tompkins, would be among the best helps in enlarging the scope and increasing the usefulness of the University.

The erection of the necessary buildings has become a burden too great for the stated income of the University. This year the funds allotted to the Mechanical and Agricultural departments for building have seriously interfered with the needs of instruction in the class-rooms. Just promotions have been denied, and overcrowded sections have failed of relief. If the University is to be allowed its natural expansion, if it is to maintain its high character beside other institutions of the highest rank for the promotion of science and learning, it must have assistance from without. The State may well be asked to see that its own child shall not be neglected; that its University shall keep pace with the best in the land. California has generously provided for its system of public education. It may surely be expected to give that system all necessary support. In no arrogant spirit, but only with a due sense of its responsibility, the University presents itself as the keystone of the arch—the most important member in the whole system—where all the members are important. The University may justly claim from the State still further help for its most pressing needs.

In this day of individual beneficence, the University does not hesitate to ask its friends to add their substantial contributions to its power and usefulness. Educational institutions in various parts of the land have been recipients of many gifts. State aid has not excluded private munificence. This University has a list of benefactors already of which it is proud. But the growth to which they have helped it necessitates further growth. It has many unsupplied wants, many unfulfilled plans. These offer the strongest inducements to lovers of education to link their names with an institution which aims at the highest welfare of all California's sons and daughters.

A few of the most immediate and urgent needs of the University are submitted to the consideration of the public.

On the side of new accommodations and equipment:

An Administration building, bringing the offices together, and furnishing a safe depository for the University records; leaving two suites of rooms now in use to be occupied as class-rooms.

A central Assembly Hall, for all public gatherings. There is no room at present which will hold more than half of the undergraduates. The Gymnasium is unsuited to public occasions, and much too small to accommodate our Commencement audiences.

A Museum building, where our valuable collections can be made secure, and our still unopened boxes can have their contents brought to light. In the present crowded quarters, much of the material is useless for purposes of instruction. In the new building rooms should be provided for the departments of science needing frequent access to the Museum collections, for material illustrative of their work.

Additions to the Library building. Rooms are needed for special libraries, and for the uses of Seminary classes.

An addition to the Students' Observatory, which is utterly inadequate to contain the classes in astronomy.

A separate building for young women. They constitute nearly a third part of the undergraduate membership, and patiently wait for better accommodations than can be given them at present.

Dormitories for young men. The rooms therein can be made a source of revenue to the University, in addition to the benefits spoken of on a preceding page.

Special mention should be made of equipment for the Scientific Departments, and additions to scientific collections. Various offers are made of larger or smaller collections, which the University has not the funds to secure.

There is equal need of illustrative adjuncts in Greek and Roman art and archæology, in classical geography, and in all historical study. Maps, photographs, casts, charts, etc., are very much wanted. The Library should be strengthened on that side. Occasionally a valuable foreign library is thrown on the market, which cannot be secured out of the ordinary appropriations.

In general, there is a loud call for large additions to the Library. Many scientific works, especially serials, seem indispensable, but their cost puts them out of present reach. On the classical, literary, and historical side, there is still more urgent need of increase. For all these departments, books are a *sine qua non*, corresponding in importance to the laboratories, collections, and apparatus of scientific study. The salary roll of the scientific departments is larger than that of the others. The equipment outlay is necessarily much greater. With nearly twice the number of students, the classical, literary, historical, and political departments may justly claim a larger equipment than they now have in the way of books, to make their efficiency correspond to that of the colleges of technological science.

On the side of instruction there is a demand for some departments in which we are wanting, both scientific and literary. Our present departments need strengthening, in order to fulfill their promise and keep pace with the best institutions in our land. The whole country is alive with interest in the higher education. Within the three years under review, millions of dollars in various parts of the United States have been given for the expansion of the higher educational work. This University asks only that it may have the means of a steady and healthful growth, commensurate with the claims of the last decade of the nineteenth century, and the larger claims of the twentieth, in which these young men and women are to become the responsible actors in civic and social life.

There is pressing need of eight or ten scholarships for young men, corresponding to the noble gift of Mrs. Hearst for young women. Some of our best students are forced to give up their studies by the scantiness of their means.

Two of our benefactors have passed away during the last twelve months. Serranno Clinton Hastings, LL.D., founder of the Hastings College of the Law, died in San Francisco, February 18, 1893. He retained his connection with the faculty of that college to the close of his life.

Henry Douglass Bacon, Esq., died in Oakland, February 19, 1893. To him we owe the Bacon Library and Art Building, with further gifts to adorn it. A man of great energy and business sagacity, he was among the earliest to appreciate the importance of the higher culture in our State. Like Judge Hastings, he was long spared to see the benefits of his generous contribution to the cause of education.

The splendid gift of James Lick, to establish the Observatory on Mount Hamilton, greatly needs a supplementary endowment for the prosecution of astronomical work. As a part of the University, the Observatory calls for a large yearly allotment from the University funds. If some enthusiastic lover of science would make provision for this important branch of our work, he would not only ally his name to the Lick Observatory, but would set free a large sum of money urgently needed for instruction in our other departments.

Subjoined are special reports from the Dean of the Faculties at Berkeley, from the Deans of three of the professional colleges, from the Director of the Lick Observatory, and from Librarian J. C. Rowell. Also, a list of the recent writings of members of the faculties.

MARTIN KELLOGG,
President of the University of California.

SUBSIDIARY REPORTS.

Of the Dean of the Colleges at Berkeley.
Of the Librarian of the General University Library.
Of the Director of the Lick Observatory.
Of the Dean of the Medical Department.
Of the Dean of the College of Dentistry.
Of the Dean of the College of Pharmacy.
List of Published Writings.
Financial Statement.

REPORT OF THE DEAN OF THE COLLEGES AT BERKELEY.

To the President of the University of California:

Sir: I have the honor to submit herewith the following report on attendance and courses of instruction in the Colleges of Letters, Agriculture, Mechanics, Mining, Civil Engineering, and Chemistry, for the academic years 1890–91, 1891–92, and 1892–93.

The following table gives the number of students in attendance each year from 1883–84 to 1892–93 inclusive, classified by status. The upper figures on the left of each column refer to young men, the lower to young women; the numbers in the lower right hand corner of each group are the totals:

Enrollment by Classes.

	1883–84.	1884–85.	1885–86.	1886–87.	1887–88.	1888–89.	1889–90.	1890–91.	1891–92.	1892–93.
Graduates	6 0 6	5 0 5	11 2 13	8 1 9	8 4 12	15 0 15	15 6 21	20 5 25	22 15 37	34 13 47
Seniors	11 7 18	18 7 25	13 4 17	29 5 34	29 3 32	34 4 38	32 7 39	40 4 44	28 8 36	27 10 37
Juniors	17 5 22	15 3 18	30 5 35	37 4 41	34 3 37	36 8 44	45 6 51	29 7 36	32 12 44	36 9 45
Sophomores	24 5 29	35 4 39	40 4 44	45 5 50	40 10 50	53 13 66	34 12 46	43 12 55	46 8 54	47 14 61
Freshmen	72 8 80	61 8 69	63 6 69	68 8 76	75 18 93	80 13 93	76 18 94	67 11 78	75 19 94	65 18 83
At Large	8 3 11	16 1 17	11 0 11	14 1 15	26 2 28	31 5 36	54 11 65	82 26 108	113 45 158	148 64 212
Special	7 0 7	10 0 10	12 4 16	16 5 21	21 5 26	27 12 39	26 17 43	30 17 47	41 40 81	58 53 111
Limited	20 23 43	36 22 58	27 18 45	26 16 42	19 9 28	15 17 32	26 16 42	42 22 64	26 17 43	31 23 54
Totals	164 52 216	196 45 241	207 43 250	243 45 288	252 54 306	291 72 363	308 93 401	352 105 457	383 164 547	446 204 650

A brief record of that part of the academic activity of the University which is represented in its instruction in the class-room, the laboratory, and the field, is given in the following table. The statistics of attendance in the various courses for the three years 1890–91, 1891–92, 1892–93, are given in parallel columns. A row of dots in one of these columns indicates that the course was not given:

RECORD OF SUBJECTS TAUGHT AND OF THE NUMBER OF STUDENTS PURSUING THEM.

Instructor.	Title of Course.	No. of Hours a Week.		No. of Students in Attendance.		
		One Term	Two Terms	1890–91	1891–92	1892–93
	PHILOSOPHY.					
Howison Stratton Henderson	1. Propædeutic to Philosophy	4	------	44	49	48
Howison Stratton Henderson	2. Introduction to Philosophy	4	------	33	31	35
Howison	3. Elementary Ethics, including Civil Polity	4	-----	14	18	18
Howison	4. Philosophy from Kant to Hegel	------	2	18	------	------
Howison	5. The Philosophy of Kant	------	2	------	24	13
Howison	6. Hegel's Logic in Harris' Exposition	4	------	------	5	------
Howison	7. Higher Ethics	4	------	7	------	12
Howison	8. The Dialektik and Methodenlehre in Kant's Kritik, followed by Hegel's Lesser Logic (Graduate Course)	------	2	4	-----	-----
Howison	9. The Philosophy of Leibnitz (Graduate Course)	------	3	------	3	------
Howison	10. Hegel's Logic (Graduate Course)	------	4	------	------	2
Howison	11. The Philosophy of Education (Teachers' Course)	------	2	------	------	33
	PEDAGOGY.					
Brown	1. The Art of Teaching	4	------	------	------	8
Brown	2. History of Education: Earlier Periods	3	------	------	------	8
Lange	3. History of Education: The Latest Period	3	------	------	------	10
Brown	4. The Theory of Education	2	------	------	------	19
Brown	5. Seminary for the comparative study of schools and school systems	2	------	------	-----	10
	HISTORY AND POLITICAL SCIENCE.					
Bacon	1. History of Europe during the Middle Ages	4	------	69	79	96
Bacon	2. Constitutional History of England	4	------	------	60	86
Bacon	3. History of Europe from the Reformation to the French Revolution	4	------	50	72	69
Bacon	4. Political History of the Nineteenth Century	4	------	50	71	68
Bacon Haynes	5. History of the English Colonies in America	3	------	39	------	9
Miller Jones Haynes	6. Political and Constitutional History of the United States	4	------	32	37	42
Jones Haynes	7. Constitution and Government of the United States	4	------	37	34	37
Moses Jones	8. Comparative Constitutional History	4	------	23	46	49
Miller Moses	9. Elementary Political Economy	4	-- ---	51	104	92
Miller Jones	10. International Law	2	------	50	------	------
Miller Moses Haynes	11. Economic History	4	------	27	23	23
Miller	12. Finance	------	1	11	------	------
Haynes	Finance and Taxation	4	------	------	------	10
Miller	13. Economic Theory	------	1	5	------	------
Moses	Economic Theory	4	------	------	------	37
Jones	14. Roman Law: Jurisprudence	4	------	8	------	------
	Roman Law	4	-----	------	14	------
	Jurisprudence	3	------	------	14	------

RECORD OF SUBJECTS TAUGHT, ETC.—Continued.

Instructor.	Title of Course.	No. of Hours a Week.		No. of Students in Attendance.		
		One Term	Two Terms	1890–91	1891–92	1892–93
Jones Moses	15. History of Political Theories	4	------	21	26	38
Jones	16. Constitutional Law of the United States	------	2	------	15	------
Moses	17. Seminary	------	1	------	------	9
Jones Miller	18. History of the XIXth Century	------	2	19	------	------
	CLASSICAL PHILOLOGY.					
Kellogg	1. Linguistics	2	------	4	6	8
Kellogg	2. Introduction to Latin Etymology	2	------	6	------	------
	GREEK.					
Senger	1. Attic Prose Authors and Homer	------	4	16	------	------
Flagg	Attic Prose Authors and Homer	4	------	------	27	25
Flagg	2. Attic Prose Authors and Herodotus	4	------	------	22	18
Bunnell	3. Plato and Euripides	4	------	------	14	19
Bunnell	4. Plato, Æschylus, Euripides, Sophocles	------	4	14	------	------
	Sophocles and Æschylus	4	------	------	15	------
	Sophocles and Lysias	------	4	------	------	17
Bunnell	5. Sophocles, Plato, Lysias, Demosthenes	------	3	6	------	------
Bunnell	6. Demosthenes, Æschines, Aristophanes	------	3	7	------	------
Bunnell	7. Lysias and Demosthenes	3	------	------	4	1
Bunnell	8. Aristophanes and Lucian	------	1	------	4	4
Flagg	9. Homer and the Elegiac Poets	3	------	------	2	2
Bunnell	10. Plato and Sophocles	2	------	------	5	2
Bunnell	11. Aristophanes or Homer	1	------	------	------	4
Flagg	12. Lyric and Bucolic Poets, Homer's Odyssey	3	------	------	2	2
Bunnell	13. Demosthenes and Æschines	3	------	------	5	------
Bunnell	14. Demosthenes, Aristophanes, and Lucian	2	------	------	4	2
	LATIN.					
G. M. Richardson L. J. Richardson	1. Livy and Latin Composition	4	------	41	67	77
G. M. Richardson L. J. Richardson	2. Cicero, Terence, and Latin Composition	4	------	46	56	64
G. M. Richardson	3. Odes, Epodes, Satires, and Epistles of Horace	3	------	35	43	45
G. M. Richardson L. J. Richardson	4. Cicero's Letters, one play of Plautus	3	------	31	44	44
Kellogg	5. Cicero's Brutus, readings from De Oratore	2	------	------	2	4
G. M. Richardson Kellogg	6. Quintilian, or Pliny	2	------	8	3	9
Flagg G. M. Richardson	7. Juvenal, or the Elegy	2	------	6	7	8
Kellogg	8. The Agricola and Annals of Tacitus	2, 1	------	8	3	8
Flagg	9. Cicero de Natura Deorum	2	------	5	13	8
Flagg	10. Lucretius de Rerum Natura	2	------	------	5	3
Flagg	11. Catullus	1	------	------	6	------
G. M. Richardson	12. Ovid's Fasti	1	------	------	9	5
Flagg	13. Latin Prose Composition	1	------	------	11	6
G. M. Richardson	14. Latin Composition for Sophomores	------	1	------	------	21
Flagg Kellogg	15. Latin Seminary	------	1	2	3	------
G. M. Richardson	16. Roman Archæology	2	------	29	17	------
Flagg	17. Roman Literature	2	------	6	------	------
G. M. Richardson	18. Private Life of the Romans	1	------	------	------	37

RECORD OF SUBJECTS TAUGHT, ETC.—Continued.

Instructor.	Title of Course.	No. of Hours a Week.		No. of Students in Attendance.		
		One Term	Two Terms	1890–91	1891–92	1892–93
	ENGLISH.					
Hubbard Bradley Syle Armes	1. English Prose Style	*	*	140	165	188
Armes	2. Practical Rhetoric	4	------	------	50	65
Armes	3. Summaries	1	------	48	53	65
Armes	4. Outline of English Literature	1	------	------	48	65
Gayley Lange Bradley	5. The Higher Rhetoric	2	------	42	51	13
Lange	6. English Literature	3	------	73	97	------
	History of English Literature	------	2	------	------	72
Lange	7. Gothic (Graduate Course)	2	------	4	------	------
Hubbard Gayley	8. Old English	3	------	5	7	10
Hubbard	9. Old English Poetry	3	------	------	3	8
Hubbard	10. Middle English	3	------	1	------	------
Lange	11. History of the English Language	2	------	18	10	------
Bradley	12. Historical and Comparative English Grammar	1	------	------	12	8
Gayley	13. Poetics	3	------	------	------	40
Gayley	14. The Æsthetics of Literature	2, 5	------	41	------	12
Armes	15. Origin and development of the English Drama	2	------	25	32	22
Lange Bradley	16. Chaucer and his Contemporaries	2	------	9	64	------
Gayley Bradley	17. The Shakespearean Drama	2, 4	------	17	21	19
Lange	18. Milton and his Contemporaries	2	------	------	27	13
Syle	19. Literature of the Fourteenth and Fifteenth Centuries	3	------	------	------	7
Lange	20. English Literature from Davenant to Wordsworth	3	------	58	------	------
Lange	21. English Literature from the Restoration to the present	3	------	------	84	------
Syle	22. English Literature of the Eighteenth Century	3	------	------	------	8
Bradley	23. The English Novel	2	------	13	------	------
Gayley	24. Poets of the Nineteenth Century	------	4, 3	15	18	13
Gayley	25. American Literature	2	------	------	------	23
Gayley	26. Problems in Literary Criticism	2	------	48	35	------
Gayley	27. Comparative Literature (Graduate Course)	------	2	2	------	------
Gayley	28. Movements and Tendencies in English Literature (Graduate Course)	------	2	------	6	------
Gayley	29. English Comedy (Graduate Course)	------	2	------	------	6
Bradley	30. Essays and Debates	2	------	------	------	7
	31. Themes: Forensics—					
Hubbard Armes Bradley	Freshman year	------	------	140	177	186
Lange	Sophomore year	------	------	102	100	111
Lange	Junior year	------	------	52	76	------
Gayley Lange	Senior year	------	------	13	14	12
------	Forensics	1	------	------	------	7
	GERMAN.					
Putzker Senger	1. Introductory Courses—1st year	------	4	72	92	98
Putzker	2. Introductory Course—2d year	------	4	55	55	64
Senger	3. German Scientific Literature	------	2	------	9	12
Senger	4. Goethe and Schiller	------	3	13	22	18
Putzker	5. Lessing	------	3	5	7	11
Senger	6. Composition and Conversation	------	2	5	6	4

RECORD OF SUBJECTS TAUGHT, ETC.—Continued.

Instructor.	Title of Course.	No. of Hours a Week.		No. of Students in Attendance.		
		One Term	Two Terms	1890–91	1891–92	1892–93
Senger	7. Middle High German	------	1	2	3	3
Senger	8. Middle High German, Old High German	------	2	------	3	------
Senger	9. Gothic	2	------	------	------	3
Senger	10. Graduate Course: Faust	2	------	------	------	6
	ROMANCE LANGUAGES.					
Paget Huntington	1. Introductory Course—1st year	------	4	86	95	129
Paget Huntington	2. Introductory Course—2d year	------	3	50	66	68
Paget Huntington	3. Junior Course	------	3	15	20	32
Paget Huntington	4. Senior Course	------	2	14	21	13
Huntington	5. French Composition	1	------	------	------	6
Paget	7. Graduate Course	------	------	------	------	5
Huntington	8. Introductory Course in Spanish	------	3	16	9	14
Paget	9. Advanced Course in Spanish	2	------	------	4	------
Paget	10. Don Quijote	------	2	------	------	6
Paget Huntington	11. Introductory Course in Italian	------	3	------	9	2
Paget	12. The Divina Commedia of Dante	------	2	------	------	3
	MATHEMATICS.					
Stringham Edwards Haskell Leuschner Pierce Hengstler	1. Trigonometry	*	------	129	224	205
Stringham Edwards Haskell Leuschner Pierce Hengstler	2. Plane Analytic Geometry	*	------	134	124	163
Stringham Edwards Leuschner Pierce	3. Solid and Spherical Geometry	*	------	102	102	91
Edwards	4. Spherical Trignometry	2	------	------	------	22
Edwards Haskell Leuschner Pierce Hengstler	5. Algebra	*	------	208	154	200
Stringham	6. Propædeutic to the Higher Analysis	3	------	17	21	24
Stringham Haskell Leuschner	7. Differential and Integral Calculus	4	------	30	34	38
Stringham Haskell Leuschner	8. Analytic Geometry of Space and Calculus	4	------	21	27	31
Edwards	9. Supplementary Course in Differential and Integral Calculus	2	------	3	4	11
Edwards Haskell	10. Determinants and Theory of Equations	*	------	5	11	3
Haskell Stringham	11. Projective Geometry	*	------	7	2	7
Stringham Haskell	12. Advanced Conic Sections	2, 3	------	3	1	2
Stringham Leuschner	13. Method of Least Squares	2	------	13	15	14
Leuschner	14. Mechanical Quadratures	3	------	------	------	3

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*The amount of time devoted to these starred subjects has varied somewhat in the three different years which this report covers. The time allowed to each has averaged about three hours a week for one term.

RECORD OF SUBJECTS TAUGHT, ETC.—Continued.

Instructor.	Title of Course.	No. of Hours a Week.		No. of Students in Attendance.		
		One Term	Two Terms	1890–91	1891–92	1892–93
Leuschner	15. Interpolation and the Use of Tables	2	------	------	14	------
Stringham	16. History of Mathematics	3	------	------	------	5
Stringham Edwards	17. Teacher's Course	------	1	5	------	6
Stringham	18. Theory of Functions of Real Variables	------	2	------	------	3
Stringham	19. Differential Equations	------	2, 3	5	3	7
Stringham	20. General Theory of Curves	2	------	------	1	------
Edwards	21. Quaternions	------	2	4	1	1
Stringham	22. Absolute Geometry	1	------	------	2	------
Haskell	23. Theory of Functions of a Complex Variable (Graduate Course)	------	2½	------	------	3
Stringham	24. Elliptic Functions (Graduate Course)	2	------	------	------	2
Haskell	25. Theory of Substitutions	2	------	------	------	2
	PHYSICS.					
John Le Conte Slate Whiting	1. General Physics	------	4, 3	89	68	65
Slate	2. Mathematical Physics	2	------	3	------	------
Slate	2. Advanced Physics	------	2	------	------	6
Slate Drew	3. Electrical Measurements	2, 5	------	3	9	------
Whiting Drew	4. Qualitative Physics	------	3	------	------	26
Slate Whiting Raymond Drew	5. Physical Laboratory (problems) or Quantitative Physics	3, 6 3, 6	------ ------	20 20	30 30	38 38
Raymond Slate	6. Physical Laboratory (advanced problems; advanced physical measurement)	6	------	13	9	8
Whiting Drew	7. Electrical Measurement	3, 5	------	4	9	6
	ASTRONOMY.					
Soulé Leuschner	1. General Astronomy	3	------	13	27	35
Soulé Leuschner	2. Practical Astronomy and Navigation, with practical work in the Observatory throughout the year	3	------	10	8	7
	CHEMISTRY.					
Rising O'Neill Gray Sharwood	1. Elementary Chemistry	4*	------	89	74	103
Rising	2. Inorganic Chemistry (Lectures)	------	3	68	45	52
Rising	3. Chemical Philosophy	------	2	3	------	------
O'Neill Gray Rising Sharwood	4. Qualitative Analysis (Laboratory)	------	10	50	48	58
Rising Lengfeld O'Neill	5. Organic Chemistry (Lectures)	------	3, 2	6	14	9
Rising O'Neill Lengfeld	6. Quantitative Analysis (Laboratory)	------	18	24	24	15
O'Neill	7. Organic Chemistry (Laboratory)	------	12	------	------	9
Rising	8. Theoretical Chemistry (Lectures)	------	2	------	------	10
O'Neill	9. Physiological Chemistry	2, 3	------	5	3	10
Rising	10. Special Laboratory Methods	------	18	------	------	3
O'Neill	11. Toxicology	2	------	------	------	----
Gray	12. Blowpipe Analysis: Qualitative	12	------	52	48	------
Rising	13. Blowpipe Analysis: Quantitative	2	------	4	------	------
Rising	14. Explosives	1	------	------	------	12

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* With Laboratory work in 1892–93.

RECORD OF SUBJECTS TAUGHT, ETC.—Continued.

Instructor.	Title of Course.	No. of Hours a Week.		No. of Students in Attendance.		
		One Term.	Two Terms	1890–91	1891–92	1892–93
	BOTANY.					
Greene Howe	1. Vegetal Structure and Morphology	3	------	26	74	47
Greene	1. Systematic and Economic Botany	3	------	22	54	35
Greene	3. Advanced Systematic Botany	------	3	5	4	4
Greene	4. Medical Botany	------	3	------	------	1
Howe	5. Cryptogamic Botany	3	*	------	2	7
	ZOÖLOGY.					
Le Conte	1. Comparative Zoölogy	------	2	60	------	130
Ritter	2. Vertebrate and Invertebrate Morphology	------	7	------	18	15
Ritter	3. Microscopical Anatomy	9	------	------	10	6
Ritter	4. Embryology	9	------	------	------	7
	GEOLOGY.					
Le Conte Lawson	1. General Geology	------	3, 2	58	39	111
Lawson	2. Field Geology	------	12	------	10	4
Lawson	3. Petrography	1	------	4	7	------
Lawson	4. Petrographical Laboratory	3	*	4	7	7
Lawson	5. Graduate Course	------	------	------	------	1
	MINERALOGY.					
Lawson	1. Crystallography, Mineralogical Terminology, and Descriptive Mineralogy	------	2	------	15	21
Lawson Palache	2. Mineralogical Laboratory	------	4	10	11	12
Lawson	3. Graduate Course	------	------	------	------	1
	MECHANICAL ENGINEERING.					
Slate	1. Analytic Mechanics	------	4	25	19	25
Hesse	2. Hydrodynamics	4	------	18	13	15
Hesse	3. Hydraulics, Hydraulic Motors, Pumps, Water Engines	2	------	8	6	6
Rixford Hall J. N. Le Conte	4. Kinematics	------	2	8	1	4
Hesse	5. Thermodynamics	------	2	8	1	4
Hesse	6. General Machine Construction	4	------	8	1	6
Hesse	7. Laboratory Construction and Experimenting	------	6	8	11	12
Cory	8. Electrical Engineering	5	------	------	------	4
	CIVIL ENGINEERING.					
Randall	1. Surveying	4	------	9	12	24
Randall	2. Railroad Engineering	4	------	9	10	14
Randall Burgess	3. Field Practice and Mapping	------	12	9	11	20
Soulé	4. Sanitary Engineering	4	------	5	9	6
Soulé	5. Strength of Materials	4	------	?	15	12
Soulé Randall	6. Engineering Structures	4, 2	------	5	8	6
Soulé	7. Irrigation and Drainage	3	------	------	------	10
	MINING, METALLURGY, AND ASSAYING.					
Christy	1. Mining	------	4	8	9	4
Christy	2. Metallurgy	------	3	13	11	8
Christy Booth	3. Assaying	------	6	11	8	5
Christy	4. Metallurgical Laboratory	6	------	7	7	7

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*Three hours a week both terms in 1892–93.

RECORD OF SUBJECTS TAUGHT, ETC.—Continued.

Instructor.	Title of Course.	No. of Hours a Week.		No. of Students in Attendance.		
		One Term.	Two Terms	1890–91	1891–92	1892–93
	DRAWING.					
Randall Burgess	1. Elements of Industrial Drawing	*	3	16	30	48
Kower	2. Descriptive Geometry	------	3	29	33	33
Randall Burgess	3. Topographical and Structural Drawing	------	3	7	11	15
Kower	4. Mechanical Drawing	------	6	9	10	11
Kower	5. Graphostatics	2	------	17	19	22
Kower	6. Construction	------	6, 9	17	13	14
Burgess	7. Free-hand Drawing	------	2	------	13	11
	AGRICULTURE, HORTICULTURE, AND ENTOMOLOGY.					
Hilgard Loughridge	1. Agricultural Chemistry	------	3	6	9	10
Wickson Woodworth	2. Elementary and Economic Entomology	------	1	14	40	24
Wickson	3. Agriculture and Horticulture	------	3	12	3	7
Hilgard Paparelli Colby	4. Viticulture and Olive Culture	2	------	6	4	3
Jaffa Paparelli Colby	5. Agricultural and Viticultural Laboratory	†	------	5	6	10
Woodworth	6. Parasitic Plant Diseases	------	2	------	6	5
Wickson	7. Agriculture	3	------	------	------	3
	MILITARY SCIENCE AND TACTICS.					
Randolph	1. Practical Course: Tactical Instruction in the Field	------	2	219	305	327
Randolph	2. Theoretical Course (Lectures and Recitations)	------	1	50	21	50
	PHYSICAL CULTURE.					
Magee	1. Elementary Course	------	2½	134	143	163
Magee	2. Advanced Course	------	1½	------	85	104
Magee	3. Course for Young Women	------	2	32	------	------

* Three hours a week one term in 1890–91.
† Twelve to twenty hours a week.

The foregoing tabulation, though usually so, is not uniformly by *courses*, but by *subjects*, and this is especially the case with some of the elementary subjects, as in English and Mathematics, where only the total number of students pursuing a subject, whether in the same or in different courses, has been given. The table therefore gives approximately the number of *subjects* taught, in the Colleges at Berkeley, in twenty-three departments of study, during each of the three years, 1890–91, 1891–92, 1892–93, namely:

140 subjects in 1890–91,
158 subjects in 1891–92,
186 subjects in 1892–93.

The aggregate number of different subjects taught in the three years, for not less than one term, was about 220. In these totals military drill and physical culture are not included.

UNIVERSITY EXTENSION COURSES.

In the years 1891-92 and 1892-93, a series of University Extension Courses was conducted under the direct auspices of the University and under the control of University authorities. A full course consisted of eighteen lectures, a half-course of nine lectures, but in several cases one or more supplementary lectures were given, and in the mathematical course of 1891-92 a full extra half-course was added. No fees were charged for any of the courses, except that in Philosophy, which was under the auspices of a local society.

The term "regular attendants" indicates *bona fide* workers in the course. In all of the courses the number of visitors, or listeners, largely exceeded the number of regular attendants, and in the English and History courses, the halls in which they were held have been inadequate for the accommodation of all of those who applied for seats. In these courses the audiences have frequently numbered four and five hundred persons.

The following courses were given:

In 1891-92.

ENGLISH: Historical and Comparative English Grammar. A half-course in San Francisco; by Associate Professor Bradley. 40 regular attendants.

ENGLISH: Shakespeare's Tragedies. A half-course in San Francisco; by Professor Gayley. 89 regular attendants.

HISTORY: The Renaissance. A half-course in San Francisco; by Associate Professor Bacon. 34 regular attendants.

HISTORY OF THE MIDDLE AGES. Ten lectures in Los Angeles in the summer vacation of 1892; by Professor Moses. 250 regular attendants.

PHILOSOPHY: Ethics. Thirteen lectures under the auspices of the Starr-King Fraternity in Oakland; by Professor Howison. 250 attendants.

MATHEMATICS: Propædeutic to the Higher Analysis. Three half-courses in San Francisco; by Professor Stringham. 29 regular attendants.

In 1892-93.

ENGLISH: The Ancient and the Mediæval Drama. A half-course in San Francisco; by Mr. Armes. 96 regular attendants.

ENGLISH: Milton. A course of nine lectures and discussions in Oakland; by Assistant Professor Lange.

PEDAGOGY: The Herbartian Pedagogy. A half-course in San Francisco; by Associate Professor Brown. 150 regular attendants.

PEDAGOGY: The Herbartian Pedagogy. A half-course in Oakland; by Associate Professor Brown. 65 regular attendants.

MATHEMATICS: The Differential and Integral Calculus. A full course in San Francisco; by Professor Stringham. 9 regular attendants.

ASTRONOMY. A half-course in Oakland; by Assistant Professor Leuschner. 75 regular attendants.

HISTORY: The Middle Ages. Lectures at Los Angeles in the summer of 1892; by Professor Bernard Moses.

GEOLOGY: The Glacial Epoch in North America. Three lectures at Los Angeles in January, 1893, and one supplementary lecture on Evolution in its relation to human progress; by Professor Joseph Le Conte.

LECTURES, ETC., UNDER THE AUSPICES OF SOCIETIES AND DEPARTMENTS.

The Philosophical Union has held regular monthly meetings, besides special meetings and adjourned sessions. During the years 1890–91 and 1891–92, twenty sessions were given to a programme of topics pertaining to the Theory of Knowledge. The work for 1892–93 was a study of the principles underlying the doctrine of Evolution, with particular reference to its bearing on the question of immortality, using as a basis for discussion Fiske's Destiny of Man. Papers were read by graduates and undergraduates of the Department of Philosophy, and by others; the discussions were opened by appointed speakers. Special addresses were made by Rev. W. R. Alger, Professor G. H. Howison, Professor Joseph Le Conte, Professor T. R. Bacon, and Rev. E. B. Payne.

The Longfellow Memorial Association still maintains a vigorous existence, and furnishes the means for wholesome literary and social intercourse between instructors, students, and many other citizens of Berkeley. Some literary topic has been discussed at each of its regular meetings, of which four are held each term. The following are some of the subjects presented for discussion, usually in the form of written papers:

The Seven Forms of Literary Expression, by Rev. W. R. Alger.
Henrick Ibsen, by Mr. L. H. Jacobs.
Rudyard Kipling, by Mr. Charles Aiken.
Language as a Test of Intellect, by President Kellogg.
A Man Without a Country, a reading by Edward Everett Hale.
Samuel Pepys, by Professor Bacon.
The Sonnet, by Dr. Edward R. Taylor.
Goethe's Homeric Studies, by Dr. G. M. Richardson.
The Ministry of Homer, by Miss Katherine M. Graydon.
Moliere and the Character Drama, by Mr. E. B. Lamare.
A Fortnight in Holland, a lecture by Rev. C. W. Wendte.

A like number of other papers, representing an equally wide range of subjects, were read and discussed during the three years 1890–93. The following programme for June 2, 1892, will indicate the general character of the society's meetings:

1. Sonata in G, Andante and Finale (*Grieg*), by Mrs. Carmichael-Carr and Mr. Sigmund Beel.
2. Paper, "Should Art Serve," by Rev. E. B. Payne.
3. Remarks upon the paper by members.
4. Concerto for Violin (*Mendelssohn*), by Mr. Sigmund Beel.
5. Retrospect, by Prof. Albin Putzker.
6. Zigeunerweisen (*Sarasate*), by Mr. Sigmund Beel.
7. General conversation.

The Science Association of the University of California was organized in December, 1891. As stated in its constitution, the object of this association is "to promote intercourse between those who are cultivating science, and to give a stronger and more general impulse and more systematic direction to scientific research at the University of California." Its membership consists of: (1) Corporate members, who must be officers, graduates, or graduate students of the University; (2) Associate members, who may be undergraduates, "or such other persons, not eligible to corporate membership, as desire to avail themselves of the privileges of the association and to promote its objects"; and (3) Patrons. The association holds eight general meetings each year, and frequent separate sectional meetings are held in the following special departments of science: (1) Mathematics and Astronomy; (2) Chemistry; (3) Geology and Mineralogy; (4) Botany; (5) Zoölogy; (6) Economic Science.

The following topics have been presented at the general meetings of the association in the form of written papers or lectures:

1. An Anomalous Topographical Form and Associated Fragments of Meteoric Iron; by Mr. Willard D. Johnson.
2. Historical Notes on some California Trees; by Professor E. L. Greene.
3. On some Oregon Trees; by Dr. Gibbons.
4. On Legal Tender Notes in California; by Professor Bernard Moses.
5. Competition as an Element in Evolution; by Major J. W. Powell.
6. On some Proposed Meteorological Stations; by Professor Frank Soulé.
7. On Retrogressive Processes in Organic Evolution; by Assistant Professor W. E. Ritter.
8. Classification of Stars Spectroscopically; by Assistant Professor Armin O. Leuschner.
9. Importance of North Pacific Weather Stations; by Dr. Marsden Manson.

At the sectional meetings the topics discussed are of a more special and technical character. No means are as yet provided for the publication of the transactions of the association.

Under the auspices of the MILITARY DEPARTMENT, the following lectures have been delivered in the Assembly Hall of the University:

1. The Proper Employment of Cavalry in War; by Captain A. E. Wood, U. S. A.
2. The Indian Question and the late Sioux War; by Captain William E. Dougherty, U. S. A.
3. Military Hygiene; by Surgeon William H. Gardner, U. S. A.
4. Torpedoes and Smokeless Powder; by Captain E. L. Zalinski, U. S. A.

THE BERKELEY ATHENÆUM, organized in 1891, has conducted during the past three years and at the smallest possible expense to those sharing in the benefits, a long series of public entertainments of an educational character in the Assembly Hall of the University. The financial responsibility and the labor thus incurred have been assumed by three members of our Academic Council, who have, by this exercise of public spirit, conferred a great favor upon our University community. These entertainments have included:

Lectures, by John Fiske, Thomas Crawford Johnstone, "Max O'Rell," and others.

Readings, by George W. Cable, Mr. George Riddle, Miss Ida Benfey, and Miss Grace Dothea Fisher.

Concerts, participated in by Mr. Sigmund Beel, Mrs. Carmichael-Carr, Mr. Louis Heine, Mr. Robert Tolmie, Mr. John W. Metcalf, and others.

The Durant-Neolean Students' Congress continues to hold semi-monthly sessions for practice in debate. Its procedure is copied in part from that of the English House of Commons, in part from that of the United States House of Representatives. A so-called Prime Minister presents and champions an hypothetical political or financial measure, which is debated and eventually passed upon by vote of the Congress. He then retires to give place to a new Prime Minister. The measures introduced are such questions of the day as the Congress of the United States might appropriately discuss: "The Tariff," "Bi-metallism," "Woman Suffrage,' "Government Ownership of Railroads and the Telegraph," "The Reform of the Civil Service," "The Jury System," etc. One or more of the contestants in the inter-collegiate debate are usually chosen from the membership of the Students' Congress.

From Mr. W. J. Drew I obtain the following statement of the business of the Students' Coöperative Association. Most of the text-books used at the University are now ordered through this association:

Summary of Sales During the Past Five Years.

	1888–89.	1889–90.	1890–91.	1891–92.	1892–93.
Sales	$7,340 85	$7,170 75	$8,905 04	$9,523 04	$12,970 93
No. of Students at Berkeley	363	401	457	547	650

As the above figures indicate, the sales of the association have increased very rapidly in the last few years. For the year 1893–94 they will be not far short of $14,500. For the past two years it has been the policy, more than ever before, to buy directly from the publishers, and many valuable concessions have thus been secured. A general reduction in prices, principally on stationery, has been made. The amount of cash on hand March 31, 1894, was $815 62; the liabilities amounted to not more than $100. Besides books and stationery, umbrellas, satchels, cutlery, and many other articles have been introduced, and the association bids fair to develop into a general merchandise store, where anything a student desires may be obtained.

Respectfully submitted.

IRVING STRINGHAM,
Dean.

REPORT FROM THE LIBRARIAN.

To the President of the University:

SIR: Detailed statements of the progress of the University Library have appeared in the annual reports of the Secretary, and the present account may be more properly of a general nature.

The character and manner of university instruction have experienced decided change during the past two decades, and the change has made itself nowhere more effectively felt than in the libraries of such higher institutions of learning. A visit to the library of almost any college in the sixties would have revealed the fact that it was the resort mainly of the professor, or occasionally of the more advanced student whose mental disposition impelled him to investigations beyond the margins of prescribed texts.

In later years the former solitude has become peopled with eager inquirers. Library architecture has changed—the dim cloistered aisles are now flooded with light; books have multiplied; periodical literature, extending its bounds to cover every domain of current thought and activity, is even too attractive.

As the means and sources of knowledge have increased, so also the facilities for its pursuit have improved. Library hours have been lengthened, and it is not improbable that in the comparatively near future some of the larger metropolitan collections will remain open continuously night and day. Those in authority have wisely concluded that the function of books is to be used rather than to be hoarded in stately array upon dusty shelves. Wear out, if you must, but don't decay in elegant idleness, is the modern injunction. The present tendency is to allow as much liberty as possible to students in their use of books, even to the extent of free access to the shelves. Librarians likewise have evolved into a higher "state," and strenuously endeavor, by improved methods of cataloguing, fuller indexing, and minuter classification, to render easily accessible the information contained in the treasures committed to their charge.

Under such conditions the modern university library is usually a veritable beehive of industry, and to such an extent in our own case that the ordinary noise caused by persons moving about is oftentimes distracting to readers. The attendance in 1892–93 increased nearly 20 per cent over that of the previous year, although the percentage of students attending the University increased but 14 per cent. Frequently there is not a vacant chair in the building, and should this legitimate use of the library continue to increase, our commodious reading-rooms may prove inadequate.

The Library, now containing over 54,000 volumes, is of such a character—furnished with many of the numerous sets of periodical literature and society publications—as to make it particularly valuable for reference. But yet numerous hiatuses in our collection are too often discovered when the serious investigator is at work, and the need of far greater endowment becomes more pressing each year, as the University expands its courses of instruction. A new, separate department of study like Botany or Pedagogy, is established; and at once it claims its share of whatever money is available for the purchase of books (which income unfortunately does not increase), and the appropriations for older departments, like History, Linguistics, or Philosophy, are decreased. In this manner all maintain a wretched existence on a famine allowance.

Graduate study is gaining strength all the time, and more generous provisions for its pursuit, especially in printed literature, must be provided. New lines of study, like practical Biology or Romance Philology, are begun under the auspices of the older departments, and immediately the lack of books becomes painfully apparent. The wisest administration, the most perfect system of cataloguing or of classification, avail nothing so long as this lack continues.

Our system of exchanges with sister institutions, with academies and associations at home and abroad, results happily in the acquisition of numerous works of permanent value. The frequent issue of "University Studies" and of departmental bulletins and reports, will enable us to extend the system more widely. State and municipal reports and documents; the publications of private institutions and individual authors, are constantly written for. So far as strength, time, and opportunity allow, we endeavor to secure everything to be had for the asking. But to obtain the books perhaps most wanted, and when they are wanted, there has been discovered no better method than an order from the Secretary's office based upon cash in the treasury.

Without prejudice to the other needs of the University, we earnestly commend the one great want of the Library to the helpful consideration of the Regents, of the Alumni, and of all friends of the institution. The reputation, the power, of a university are sustained in large measure by its collection of books. Larger emolument may draw away from us an honored instructor; the labors of the most profound scientist sometimes must cease; and the eloquent voice of the most popular teacher at last will be heard no more. Of a less transitory nature is the library. Build the university, by enlarging its stores of learning.

J. C. ROWELL,
Librarian.

REPORT OF THE DIRECTOR OF THE LICK OBSERVATORY.

Lick Observatory, University of California,
September 1, 1893.

To the President of the University of California:

Dear Sir: I have the honor to submit to you my sixth annual report as Director of the Lick Observatory. I beg also to refer you to the five previous reports on file in your office (one of which is printed in full in the President's Report for 1890, page 104, *et seq.*).

ORGANIZATION OF THE LICK OBSERVATORY.

The organization of the Observatory, September 1, 1893, is as follows:

Martin Kellogg, LL.D.	President of the University.
Edward S. Holden	Director and Astronomer.
J. M. Schaeberle	Astronomer.
E. E. Barnard	Astronomer.
W. W. Campbell	Astronomer.
R. H. Tucker, Jr.	Astronomer.
A. L. Colton	Assistant Astronomer.
C. D. Perrine	Secretary.
John McDonald	Machinist.
R. P. Fraser	Carpenter.
H. K. Curtis	Janitor.
Ben Rodie	Laborer.
J. Ward	Laborer.

It may be of interest to quote here, for comparison, the number of persons engaged in purely astronomical work at a few of the leading observatories. (The Lick Observatory now has 7 observers.)

Observatory of Greenwich	About 20.
Harvard College Observatory	About 40.
Observatory of Paris	17 astronomers and many computers.
Observatory of Pulkowa	16.
Observatory of Rio Janeiro	16.
Observatory of Washington	19.

At least as much is expected from the Lick Observatory as from any one of these establishments. It should, I think, be the policy of the University to encourage a school of astronomy for graduate students here. Advanced students of ability find admirable opportunities for study at Mount Hamilton, and their work of observation can be so directed as to aid the scientific researches of the institution in a very important degree. Such students are received here on practically the same footing as skilled assistants.

CHANGES IN THE STAFF DURING THE YEAR.

At a meeting of the Regents held June 14, 1892, S. D. Townley was appointed Hearst Fellow in Astronomy from July 1, 1892, to July 1, 1893. He has been paid $30 a month during that period from the Hearst Fund, and quarters at Mount Hamilton have been furnished to him. He left the Observatory on June 30, 1893.

At a meeting of the Regents held January 12, 1893, C. D. Perrine was appointed Secretary of the Lick Observatory, and A. L. Colton was appointed Assistant Astronomer of the Lick Observatory.

At a meeting of the Regents held February 14, 1893, R. H. Tucker, Jr., was appointed Astronomer from July 1, 1893. Adolph Morawski was (temporarily) appointed Instrument Maker from March 1 to July 1, 1893. The services of the latter were utilized in making much needed repairs to some of the instruments, and in constructing new pieces of apparatus.

LEAVES OF ABSENCE.

Professor Campbell was granted a leave of absence from December 1, 1892, to February 1, 1893.

Professor Barnard was granted a leave of absence for six months from February 1 to August 1, 1893, "to visit the principal observatories of this country and Europe." This leave was subsequently extended to October 1st, but Professor Barnard returned to the Lick Observatory August 24, 1893.

Mr. Colton was granted a leave of six weeks from April 4, 1893.

Professor Schaeberle was absent on the eclipse expedition to Chile from January 16 to July 22, 1893.

REGULATIONS OF THE LICK OBSERVATORY.

The Regents have established a special set of regulations for the government of the Lick Observatory, to which I beg to call your attention. These are printed in the Report of the Secretary of the University for 1888, page 26.

Every important official action is recorded in our letter books or in a regularly kept journal.

ASTRONOMICAL WORK AT THE LICK OBSERVATORY.

It is quite impossible to give an adequate account of the astronomical work of so active an establishment as the Lick Observatory without taking more space than is available in a report like the present one.

I beg therefore to refer you to the list of publications made by the astronomers during the period, September 1, 1892, to September 1, 1893, which is annexed hereto, calling your special attention to Professor Schaeberle's observations of the total solar eclipse of April, 1893, in Chile; to Professor Barnard's discovery of the fifth satellite of Jupiter on September 9, 1892; and to Professor Campbell's spectroscopic observations of Nova Aurigæ, of bright line stars, and of nebulæ.

VISITORS.

The regulations relating to visitors remain as always:

The Observatory building will be open to visitors during office hours, every day in the year. Upon their arrival visitors will please go at once to the Visitors' Room and register their names.

An hour or so can be profitably spent in viewing the various instruments, and the rest of the stay can be well spent in walks to the various reservoirs, from which magnificent views of the surrounding country can be had.

At least an hour and a half of daylight should be allowed for the drive from the Summit to Smith Creek. There are no hotel accommodations at the Summit.

For the present, visitors will be received at the Observatory to look through the great telescope every Saturday night, between the hours of 7 and 10, and at these times only.

Whenever the work of the Observatory will allow, other telescopes will also be put at the disposition of visitors on Saturdays, between the same hours (only).

At 10 P. M. the Observatory will be closed to visitors, who should provide their own conveyance to Smith Creek, as there is no way of lodging them on the mountain.

It is expected by setting apart these times for visitors (which will allow freer access to the Lick Observatory than is allowed to any other observatory in the world), that all interested may be able to arrange their visits in conformity to them; and that the remaining hours of the week will be kept entirely uninterrupted, in order that the astronomers may do their work, upon which the reputation and the good name of the Observatory entirely depend.

By order of the Committee of the Regents on the Lick Observatory.

T. G. PHELPS,
Chairman.

Our visitors' books show:

Visitors admitted for the year ending June 1, 1889	6,400
Visitors admitted for the year ending June 1, 1890	5,132
Visitors admitted for the year ending June 1, 1891	5,005
Visitors admitted for the year ending June 1, 1892	5,959
Visitors admitted for the year ending June 1, 1893	5,472
Visitors admitted since June 1, 1888	27,968

Most of the visitors arrive here about 1:30 P. M., and spend an hour or more at the Observatory. They are conducted through the buildings by the Janitor.

On Saturday nights the number of visitors ranges from 40 to 250. Each person is shown the most interesting objects through the 36-inch and the 12-inch equatorials. The whole force of the Observatory is on duty at these times and as long as the visitors remain, and no pains are spared to make their stay profitable and interesting. The senior classes in Astronomy in various California colleges have been specially invited to visit the Observatory on special evenings set apart for them. Similar privileges have been granted to various conventions meeting in San Francisco and San José. Lectures have been given by the astronomers in various places.

The Astronomical Society of the Pacific (which now numbers over five hundred members) holds its summer meetings at Mount Hamilton. The Director has replied to hundreds of letters of inquiry on astronomical subjects addressed to the Observatory, and has furnished telegrams, etc., on subjects of general interest to the press.

The time-service is maintained as before, and the noon-signal from the Observatory reaches nearly every railway station between San Francisco and Ogden, San Francisco and Portland, and San Francisco and El Paso.

In these and other ways the Lick Observatory is made directly useful to the public; and it cannot fail to have an important part in the intellectual advancement of the State and of the whole country.

SCIENTIFIC VISITORS TO THE LICK OBSERVATORY.

A number of scientific men have made professional visits to the Lick Observatory, and have been given every facility. Among them may be named Dr. Max Wolf, Professor of Astro-Physics at the University of Heidelberg, Germany; Dr. Eugene V. Gothard, Director of the Observatory of Hereny, Hungary; Dr. Stephen V. Gothard, of the University of Vienna; Dr. M. W. Meyer, Director of the Observatory of Urania, Berlin; Professor S. P. Langley, Secretary of the Smithsonian Institution, Washington, D. C.; Dr. F. Reuleux, Professor in the Technical Hochschule, Berlin; Dr. H. Bunte, Professor in the Technical Hochschule, Karlsruhe; and others.

FOREIGN ASTRONOMERS WHO ARE WORKING IN COÖPERATION WITH THE LICK OBSERVATORY.

In my last report, I mentioned the work which the following foreign astronomers were doing in connection with the Lick Observatory; namely, Professor Weinek, Director of the Observatory of Prague; Dr. Franz, astronomer of the Observatory of Königsberg; Dr. Boeddicker, astronomer in Lord Rosse's Observatory; Dr. Ebert, Professor University of Erlangen; A. Stanley Williams, Esq., Private Observatory, Brighton, England. These gentlemen are continuing to give us their aid.

We have also received during the past year most important assistance from Baron Alfred de Rothschild, of Vienna, who has enlarged our photographs of the moon (by the carbon process) far better than we have been able to do it up to the present time, and who still continues his successful experiments in this direction.

I beg to call your attention to the fact that the services of these distinguished experts are as valuable to us as if they were permanently attached to the staff of the Lick Observatory, and to note therefore our great and lasting indebtedness to them. This indebtedness has been gracefully recognized in the case of Professor Weinek, by the action of the Regents in conferring upon him the honorary degree of Sc.D.

GRADUATE STUDENTS.

The following named persons were registered as students during a part or the whole of the academic year. We were obliged to decline to receive any others, on account of the lack of suitable quarters:

S. J. Cunningham, Sc.D., Professor of Astronomy and Director of the Observatory, Swarthmore College, Pennsylvania. (Special.)

William J. Hussey, B.S., C.E., Associate Professor of Astronomy, Stanford University, California. (Special.)

A. O. Leuschner,* B.A., Assistant Professor of Astronomy in the University of California, Berkeley. (Cand. Phil.)

Henry S. Pritchett,† M.A., Professor of Astronomy and Director of the Observatory, Washington University, St. Louis, Missouri. (Special.)

Herman D. Stearns, B.A., Instructor in Physics in the Stanford University, California. (Special.)

Sidney D. Townley, B.S., M.S., Hearst Fellow in Astronomy. (Cand. Phil.)

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*Continuing his work at Berkeley.

†Unable to present himself on account of trouble with his eyes.

In a few months the Lick Observatory will be able to offer quarters to intending students, and it is likely that the list of students will be materially larger during the next year.

I beg to call your notice to the remarks on the instruction of graduate students, and of their services to us, given in my last report.

UNDERGRADUATE STUDENTS.

I have no changes to make in my report of September 1, 1892.

TOMB OF JAMES LICK.

I have no changes to make in my report of September 1, 1892.

INSTRUMENTS OF THE OBSERVATORY.

I have no changes to make in my report of September 1, 1892.

BUILDINGS OF THE LICK OBSERVATORY.

Nearly all of the buildings of the Lick Observatory are in excellent condition inside and out. *All the work upon them during the past year has been done by our own workmen.*

NEW QUARTERS AT LICK OBSERVATORY.

The Regents have ordered the construction of two brick houses, to be used as residences by Professor Barnard and Professor Campbell; 128,000 brick have been burned on the reservation for the purpose. A good deal of work has already been done in making roads, preparing sites, laying water and sewer pipes, etc. When these houses are ready we shall have suitable quarters available (in the old brick house) for the Regents and the President during their official visits.

WATER SUPPLY.

The automatic pumping plant mentioned in my last report works satisfactorily. Two wooden tanks have been erected at Copernicus reservoir, for power, and two more will be added during the present year. Our water supply will soon be entirely adequate, so long as everything is kept in first-rate order.

A new thirty horse-power boiler has been put in to replace the old pumping boiler at Aquarius.

FIRE DEPARTMENT.

I have nothing to add to my report of last year. The fire apparatus is constantly inspected, and it is now in good order.

PLANTING TREES ON THE RESERVATION.

In addition to the paragraph on this subject in my last report, I would respectfully suggest that the Agricultural Department of the University be empowered to establish a Forestry Station here. Professor Greene, of the University, has published a very full list of the plants and trees growing on the reservation at the present time.

FENCING THE RESERVATION—CORNERS OF THE RESERVATION.

I have nothing to add to my previous reports.

TELEPHONE AND TELEGRAPH LINE.

I have nothing to add to my previous reports, except that the line is now in good condition throughout.

CIRCULATING LIBRARY.

I have nothing to add to my previous reports.

GIFTS TO THE LICK OBSERVATORY.

Gifts of books, etc., to our library are regularly acknowledged in the reports of the Secretary of the University. They are very numerous and valuable. We receive the publications of all the principal observatories in the world and of a great number of Academies of Science (including those of Paris, London, Berlin, Dublin, Vienna, Munich, Rome, etc.), as well as generous gifts of special memoirs from scientific men all over the world. In return for such gifts, the publications of the Observatory are distributed, so far as the editions are sufficient. A list of all books and photographs sent out is kept at the Lick Observatory.

GIFTS OF MONEY TO THE LICK OBSERVATORY.

I have nothing to add to my report of last year. The total money gifts to the Lick Observatory since 1888 have been nearly $10,000.

HEARST ENDOWMENT FUND.

I have nothing to add to my report of last year.

DISCOVERY OF A FIFTH SATELLITE TO JUPITER.

On September 9, 1892, Dr. Barnard detected a fifth satellite to Jupiter, a discovery which reflects the greatest credit upon him and upon the Lick Observatory. The new satellite was assiduously observed by him, and the observations were printed in the "Astronomical Journal." The calculations to determine the orbit of the satellite have been undertaken by Professor H. S. Pritchett, of the Washington University of St. Louis.

SOLAR ECLIPSE OF APRIL, 1893.

The expenses of this expedition were met by the Hearst Fund. The expedition was a complete success in every way, and the photographs secured will be of the highest scientific importance.

The Regents have authorized the publication of a special report on this subject, to which I beg to refer you.

SPECTROSCOPIC OBSERVATIONS.

The spectroscopic observations of Professor Campbell, on Nova Aurigæ, on comets, and on nebulæ, deserve particular mention, but they are too special to be described in this place.

CONCLUSION.

There are many other topics of which it would be perfectly appropriate to speak in a report like the present, but which I have omitted in order to keep within reasonable limits of space.

The "Notices from the Lick Observatory," regularly printed in the "Publications A. S. P.," give the history of the institution in a permanent form, and allow its progress to be traced from month to month.

I trust I may be allowed, as in some manner the spokesman for my colleagues, to express our sense of the generous support which the Observatory has received from the Regents during its whole history. I feel sure that I have a right to say also that no work has been spared on our part to make the best use of the opportunities which have been afforded us.

Respectfully submitted.

EDWARD S. HOLDEN,
Director of the Lick Observatory.

REPORT FROM THE MEDICAL DEPARTMENT.

To MARTIN KELLOGG, LL.D., *President of the University of California:*

DEAR SIR: I have the honor of making the following report of the progress and needs of the Medical Department of the University.

It has been the aim of the Faculty to give a thorough course of instruction in the science and art of medicine, and to keep the department on a level with the most advanced medical schools. The Faculty has spared no effort to obtain all the apparatus and appliances for the teaching of medicine in its modern form, having recently established well-equipped microscopic and bacteriological laboratories. Notwithstanding the fact that the course of instruction has become more extensive and the requirements for graduation more rigid, there has nevertheless been a gratifying increase in the number of matriculants since the last report. In the session of 1890 there were 84 students in actual attendance; in the session just closed there were 115.

The improvements made by the Faculty have been accomplished in the face of serious disadvantages. The building now occupied, the gift of Dr. H. H. Toland, has become unfit for the teaching of modern medicine. Repairs are so frequently required that the funds are largely used for this purpose alone, preventing the Faculty from making improvements that are sadly needed. Besides this, since the college was founded, the growth of the city has been such that the building is far removed from the business and residence centers. The students bitterly complain of the loss of time necessitated by the great distance separating the college from the City and County Hospital, where their clinical work is done.

From the sale of a portion of the land originally deeded to the University by the late Dr. Toland a lot has been purchased directly opposite the City and County Hospital. For many years the Faculty has sought to obtain an appropriation from the State Legislature for the purpose of erecting a suitable building upon this lot. At the last session of the Legislature the hopes of the Faculty were raised by the almost unanimous passage of a bill appropriating $250,000 for a building for all the affiliated departments of the University. It was felt that from the establishment of such an institution the University could enter upon a new and broader path of prosperity. Its influence upon the *esprit de corps* of the Faculties of the various affiliated colleges, upon the University as a whole, and upon the public at large could not be overestimated. Unfortunately, however, such large appropriations had been made for other purposes that the Governor did not see his way clear to approve the bill.

The Medical Department of the University suffers from a weakness common to almost all American medical institutions, in the insufficiency of the preliminary education of the matriculants. While the examinations required of those who seek admission to this department are already as severe as are those required by the most advanced medical colleges of the country, the Faculty has determined that, beginning with the year

1895, matriculants not possessing credentials sufficient to entitle them to admission to the Academic Colleges of the University must pass an examination similar to that required of matriculants at Berkeley.

The Faculty, having long recognized that three years is too short a period within which to acquire a thorough knowledge of the science and art of medicine, has recently resolved to lengthen the course to four years. The first year of this course is to be spent at Berkeley in the study of Chemistry, Physics, Botany, Comparative Anatomy, and Comparative Physiology.

The Faculty earnestly hopes that the Board of Regents will appreciate the efforts to raise the standard of medical education, and devise some means by which better quarters, more suitable to the needs of the college, may be obtained, and by which the Faculty may be given some source of revenue with which to meet the expenses of the institution besides the fees paid by students.

Respectfully submitted.

R. A. McLEAN,
Dean of the Medical Faculty.

REPORT FROM THE COLLEGE OF DENTISTRY.

To Martin Kellogg, LL.D., *President of the University of California:*

Dear Sir: Since our last report the increasing attendance in the College of Dentistry has rendered it necessary to obtain better class-rooms and increased laboratory facilities for our practical course. These were secured in the new Donohoe building, at No. 18 Taylor Street, where we opened our tenth session on June 6, 1891. Each session since we have been obliged to add to our rooms, and with the opening of the twelfth session, on September 4, 1893, we found that our attendance had outgrown even the quarters there obtainable. We shall be obliged, before the opening of another session, to secure better accommodations elsewhere. The attendance for the present term shows an increase of more than 35 per cent over any previous session, and if the ratio is the same for 1894–95, we must provide for over 200 students.

This great increase has been made in spite of an advanced standard of entrance requirements, additions to which have been made each year until we are now well in advance of any technical school in the country. We hope at no distant day to require all matriculants to present themselves at Berkeley or other stated places of examination, and there take such an examination as may be prescribed by the authorities of the University, as is now the custom in the Hastings College of the Law of the University.

We have changed the time of holding our sessions from summer to winter terms, beginning now on the first Monday in September, and closing the 31st of May following. This makes our intermission coincident with that of the academic department, and will permit of our matriculants taking the entrance examinations.

It is the desire of our Faculty to secure the recognition of its diplomas abroad, particularly by the Boards of Registration of Great Britain, France, and Germany, which can only be accomplished by increasing our standard of entrance requirements. Our curriculum is already in advance of other university schools, and is being constantly perfected.

The only thing needful to make our work more efficient is a paid teaching corps, who could afford to devote more time to the work than is possible under the present arrangement. Every member of our Faculty is actively engaged in the practice of either medicine or dentistry, and all, with the exception of staff instructors, give their time to the college work gratuitously.

Our income is all spent in equipment and running expenses, so that no fund has been accumulated for building purposes. If the affiliated colleges of the University ever have a central building or cluster of buildings, such as was designed in the recent petition for a State appropriation, we shall hope with the other participating colleges to add to the renown of the mother University. We have laid the foundations and established the policy of a school for technical training second to no other in the United States. Already graduates of the school are taking rank abroad in various parts of the world, for while filling a long-felt local want, we are attracting students from Central and South America, Hawaii, Australia, and British Columbia. Our advanced curriculum seems to attract instead of repelling students, as witness the largely increased attendance during the past four years, and the better quality of material presented.

Yours respectfully,

L. L. DUNBAR,
Dean.

REPORT FROM THE COLLEGE OF PHARMACY.

To President Martin Kellogg, *University of California:*

Sir: I am pleased to report to you that the College of Pharmacy is in a fairly satisfactory condition. While much cramped by its limited resources, and by the conditions which render those resources less effective than they might be under some circumstances, the college has the great benefit of an unusual degree of enthusiasm on the part of its Trustees and officers, who sustain the Faculty in their work as handsomely as possible.

Since the last report made to the former President, the college has added to its curriculum a Chair of Microscopy and Vegetable Histology, has enlarged its laboratory facilities, and extended its laboratory instruction. It has also made some progress in systematizing the lectures, so that the professors are required to adhere to a published syllabus, and an attendance at three fourths of all the lectures and quizzes is now demanded of every student who presents himself for examination at the close of the term. Microscopes and microscopical appliances have been purchased, and some other apparatus, as well as materia medica specimens, which are now supplied to the students for dissection and examination.

Nevertheless, the college is greatly in need of more room for its work, as well as more apparatus and appliances. We have but one lecture-hall, whereas we need at least two. The laboratory is much too small for the present number of students. In place of one chemical laboratory, we need two: one for pharmaceutical work, and the other for analytical work, each fitted up for its own special work.

The quiz-room, which is now used as a microscopical laboratory, is too small, and in some respects not well adapted to the purpose, and our apparatus for illustrating physics is altogether inadequate.

The finances of the college are limited, and are drawn upon to pay interest on mortgage, city taxes, etc. The several professors receive a small salary only, so small that they are obliged to have an income from other sources to enable them to live. Unfortunately, the occupancy of a chair in a College of Pharmacy does not, as in some other similar institutions, bring to the incumbent revenue from without. Rather, it impoverishes him by distracting his attention from his other business, and using up his time when it could be more profitably employed in other directions. The fact that his time and strength are not wholly or chiefly devoted to his duties as professor is detrimental to the college. Hence, it would be a great gain to the latter if each professor could be paid enough to secure his entire services. This cannot be accomplished so long as a large part of the fees are expended yearly in improvements and repairs to buildings, interest on mortgage, taxes, insurance, as well as the purchase of apparatus and teaching appliances. As the college does not receive any funds from the State, from the University, or from private endowments, it is only by a most conscientious and rigorous economy that its most urgent needs can be met from time to time, while the Professors and Trustees receive only a small remuneration for their work.

Had the professional colleges been able to obtain a building which would have given the Department of Pharmacy, as well as the other colleges on this side of the bay, the needed lecture-halls, laboratories, and other premises, it might have been possible in the course of a few years to overcome some of the drawbacks above referred to. As it is, we must simply go on doing our work as efficiently as we can, putting the more effort into it to make up for needed facilities, patiently bearing in mind the law that governs alike the woodchopper and the teacher of pharmacy: "If the iron be blunt and he do not whet the edge, *then must he put to more strength.*"

Very respectfully yours,

W. M. SEARBY,
Dean of the College of Pharmacy.

LIST OF PUBLISHED WRITINGS OF OFFICERS OF THE UNIVERSITY, 1890–93.

EDWARD EMERSON BARNARD, A.M., Astronomer.

1. On the black transit of the fourth satellite of Jupiter, observed on August 13, 1890. *Publ. A. S. P.*, no. 10.

2. Dark transit of the third satellite of Jupiter. *Publ. A. S. P.*, no. 11.

3. Simple method for pointing a photographic telescope. *Publ. A. S. P.*, no. 10.

4. On the photographs of the Milky Way, at the Lick Observatory, 1889. *Publ. A. S. P.*, vol. 2, p. 240; *Photo. Times*, vol. 21, February 20, 1891.

5. Comets I and II, 1889; and some suggestions as to the possibility of seeing the short period comets at aphelion. *Ast. Jour.*, vol. 10, p. 67.

6. Apparent duplicity of the first satellite of Jupiter (1890, September 8). *Ast. Nach.*, no. 2995.

7. Additional observations of the companion C to Brooks' comet (1889). *Ast. Nach.*, no. 2998.

8. A cluster of eighteen small nebulæ discovered with the 36-inch refractor of the Lick Observatory. *Ast. Nach.*, no. 2998.

9. Discovery and observations of Comet *d*, 1890 (D'Arrest's comet, discovered October 6, 1890). *Ast. Jour.*, vol. 10, pp. 87, 88, and *Ast. Nach.*, no. 2997.

10. The re-discovery of D'Arrest's comet. *Sid. Mess.*, 1890.

11. On the re-discovery of D'Arrest's comet. *Ast. Jour.*, vol. 10, p. 92.

12. Observations of Comet *b*, 1890 (Coggia, July 18). *Ast. Jour.*, vol. 10, p. 100.

13. Observations of Comet *c*, 1890 (Denning, July 23). *Ast. Jour.*, vol. 10, p. 95.

14. Observations of Comet *e*, 1890 (Zona, Nov. 15). *Ast. Jour.*, vol. 10, pp. 101, 110, 127.

15. On the re-observation of Comet V, 1889 (Brooks, July 6, 1889), with the 36-inch equatorial of the Lick Observatory. *Ast. Jour.*, vol. 10, p. 111.

16. Comet *e* (Zona, Nov. 15) and *f* (Spitaler, Nov. 16). *Ast. Jour.*, vol. 10, p. 120.

17. On the nebulosities of the Pleiades and on a new Merope nebula. *Ast. Nach.*, no. 3018. (See *Ast. Nach.*, no. 3032.)

18. A new planetary nebula. *Ast. Nach.*, no. 3017.

19. Observations of Venus near inferior conjunction (Dec., 1890). *Sid. Mess.*, Jan., 1891, p. 43; *Ast. Nach.*, no. 3018.

20. Note on Comet V, 1889 (Brooks, July 6, 1889). *Ast. Jour.*, vol. 10, p. 136. (See also *Ast. Nach.*, no. 3014, col. 231.

21. A strange astronomical coincidence (discovery of Spitaler's comet near Zona's comet). *Sid. Mess.*, Jan., 1891, p. 18.

22. Observations of Comet 1889, V (Brooks), and extract from a letter to Dr. Berberich, announcing the re-observation of the comet. *Ast. Nach.*, no. 3009.

23. Observations of Comet *f*, 1890 (Spitaler, Nov. 16). *Ast. Jour.*, vol. 10, p. 148.

24. Observations of Comet *e*, 1890 (Zona, Nov. 15). *Ast. Jour.*, vol. 10, p. 151.

25. Photographing with a non-photographic telescope. *Anthony's Inter-An.*, 1891, and *Sid. Mess.*, 1891, p. 331.

26. On the comparison of the photographs of the Milky Way in R. A. $17^h\ 56^m$, Dec. 28, in *Know.*, July, 1890, and Mar., 1891. *Know.*, vol. 14, p. 93.

27. Ephemeris for the return of Wolf's periodic comet, 1884, III, by Dr. Berberich. Communicated by E. E. Barnard to *Ast. Jour.*, vol. 10, p. 175.

28. Discovery and observations of a comet (1891, Mar. 29, Comet *a*, 1891). *Ast. Jour.*, vol. 10, pp. 183, 190.

29. On an early search for Weinek's comet before perihelion. *Ast. Nach.*, no. 3038.

30. The new Merope nebula. *Ast. Nach.*, no. 3032 (see no. 3018).

31. Observations of Comet V, 1889 (Brooks), made with the 36-inch refractor, and on the extended visibility of three small comets of 1889. *Ast. Jour.*, vol. 11, p. 5.

32. Observations of D'Arrest's comet. *Ast. Jour.*, vol. 11, p. 6.

33. Re-discovery (May 3, 1891) and observations of Comet Wolf (1884, III). *Ast. Nach.*, no. 3046.

34. Ditto. *Ast. Jour.*, vol. 11, pp. 7, 13.

35. Re-discovery of Wolf's periodic comet. *Sid. Mess.*, June, 1891, p. 287.

36. Observations of the transit of Mercury, May 9, 1891. *Sid. Mess.*, June, 1891, p. 291.

37. Observation of the contacts, diameter, and position of Mercury, at the transit of May 9, 1891. *Publ. A. S. P.*, vol. 3, p. 230.

38. Note on the visibility of Mercury during transit. *Publ. A. S. P.*, vol. 3, p. 233.

39. Observations of the zodiacal counter-glow or *gegenschein*, made at Mount Hamilton during the years 1888–89–90–91. *Ast. Jour.*, vol. 11, p. 19.

40. Observations and photographs of the lunar eclipse of July, 1888. In *L. O. Eclipse Report* (Dec., 1888), p. 117.

41. Observations of the planet Jupiter and his satellites during 1890 with 12-inch equatorial of the Lick Observatory. *Mon. Not. R. A. S.*
42. Request for observations of the first satellite of Jupiter at its transits during 1891. *Ast. Nach.*, no. 3051.
43. Observations of Eucharis (181), (1891). *Ast. Nach.*
44. Re-discovery and observation of Encke's comet (Aug. 1, 1891). *Ast. Jour.*
45. Note on the first satellite of Jupiter. *Mon. Not. R. A. S.*
46. On the phenomena of the transits of the first satellite of Jupiter. *Mon. Not. R. A. S.*
47. Note on the August meteors. *Sid. Mess.*
48. A passage of Wolf's comet through the Pleiades. *S. F. Exam.*, Aug. 24, 1891.
49. Observations of the rings of Saturn. *Ast. Jour.*
50. On a classification of the periodic comets. *Ast. Jour.*, vol. 11, p. 46.
51. Relative motions of the spots and markings on the surface of Jupiter, from micrometrical observations made at the Lick Observatory. *Sid. Mess.*, Oct., 1891, p. 413.
52. Remarkable spots on the planet Jupiter. *Ast. Nach.*, no. 3063.
53. Re-discovery and observations of the periodic comet of Swift (1880, IV), Sept. 27, 1891 (*d* 1891). *Ast. Jour.*, vol. 11, pp. 56, 62; *Ast. Nach.*, no. 3061.
54. Color changes in the markings on the surface of the planet Jupiter. *Mon. Not. R. A. S.*, vol. 52, p. 6.
55. Discovery and observations of a comet (*e* 1891, discovered Oct. 3, 0^h 55^m G. M. T.). *Ast. Jour.*, vol. 11, p. 63; *Ast. Nach.*, no. 3061.
56. Observations of the spots and markings on the planet Jupiter, made with the 12-inch equatorial of the Lick Observatory. *Mon. Not. R. A. S.*, vol. 52, p. 7.
57. Observations of the difference of declination 21 Asterope and 22 Asterope at the transit of Wolf's comet, Sept. 3, 1892. *Ast. Nach.*, no. 3072.
58. Comet 1889 I. *Ast. Jour.*, vol. 11, p. 51.
59. Filar micrometer observations of Comet *e*, 1891 (Barnard, Oct. 2), made with the 12-inch equatorial of the Lick Observatory. *Ast. Jour.*
60. Drifting meteor trains. *Sid. Mess.*, Oct., 1891, p. 426. Reprinted by request from vol. 1, *Sid. Mess.*
61. Observations of the partial phase of the total eclipse of the moon, November 15, 1891. *A. & A. P.*, Jan., 1892, p. 92.
62. Filar micrometer observations of Comet 1889, IV. *Ast. Jour.*, vol. 11, p. 75.
63. Filar micrometer observations of Comet 1890, II. *Ast. Jour.*, vol. 11, p. 79.
64. The great nebulous areas of the sky. *Knowledge*, Jan. 1, 1892, p. 14.
65. On the phenomena of the transit of the first satellite of Jupiter, September 8, 1890, and observations of the red spots on the planet. *Mon. Not. R. A. S.*, vol. 52, p. 156.
66. Transparency of the crape-ring of Saturn and other peculiarities, as shown by the observations of the eclipse of Jupiter on November 1, 1889. *A. & A. P.*, 1892, p. 119.
67. Some former superstitions about comets. *San José Democrat.*
68. Disappearance of the new red spot on Jupiter; the great red spot and other Jovian phenomena. *A. & A. P.*, Jan., 1892, p. 93.
69. Swift's comet. *S. F. Examiner*, Mar. 12, 1892.
70. Observations of the re-appearance of the rings of Saturn. Observations of the position-angles of the rings, and observations of the satellites. *Mon. Not. R. A. S.*, vol. 52, p. 419.
71. Comet Swift (March 6, 1892). *Ast. Jour.*, vol. 11, p. 158.
72. Filar micrometer observations of comet Denning (Mar. 19) made with the 12-inch equatorial of the Lick Observatory. *Ast. Jour.*, vol. 11, p. 160.
73. A new nebula. *Ast. Jour.*, vol. 11, p. 168.
74. Two probably variable nebulæ. *Ast. Nach.*, no. 3097.
75. The lunar craters Alpetragius and Thales. *Ast. Nach.*, no. 3097.
76. Swift's comet. *S. F. Examiner*, Apr. 17, 1892.
77. Observations and photographs of Swift's comet. *A. & A. P.*, May, 1892, p. 386.
78. A simple and rapid method of detecting changes on celestial photographs due to motion or variability of the celestial bodies. *Ast. Nach.*, no. 3101.
79. The nebula near Denning's comet on Mar. 21. *Ast. Nach.*
80. Aurora at Mount Hamilton (May 18, 1893). *A. & A. P.*, 1892, p. 539.
81. A new nebulous star and corrections to Dreyer's N. G. C. *Ast. Nach.*, no. 3101.
82. Brilliant aurora at Mount Hamilton, June 26, 1892. *A. & A. P.*, Aug., 1892.
83. Photographic nebulosities and groups of nebulous stars. *Ast. Nach.*
84. Recent observations of Jupiter, the red spot and its changes. *A. & A. P.*, 1892.
85. Nova Auriga *a* nebula. *A. & A. P.*, 1892.
86. Nova Auriga nebula. *Ast. Nach.*, no. ——.
87. Photographs of Swift's comet (Mar. 6, 1892) made with the Willard lens of the Lick Observatory. *Knowledge*, 1892.
88. Observation of the occultation of Mars, September 3, 1892. *Publ. A. S. P.*, vol. 4, p.—
89. Preliminary remarks on the observations of Mars, 1892, with the 12-inch and 36-inch refractors of the Lick Observatory. *A. & A. P.*, Oct., 1892, p. 680.
90. Discovery and observations of a fifth satellite to Jupiter. *Ast. Jour.*, vol. 12, p. 81; *Publ. A. S. P.*, vol. 4, p. 199.
91. The fifth satellite of Jupiter. *S. F. Examiner*, Sept., 1892.
92. An account of the discovery of a fifth satellite of Jupiter. *A. & A. P.*, 1892, p. 749; *Ast. Nach.*, no. 3125.

93. Which owns the new satellite, Mr. Cogley or Mr. Cartright? *San José Mercury*, Oct., 1892.
94. Photographic discovery and visual observations of a comet (Barnard, Oct. 12, *e*, 1892). *Ast. Jour.*, vol. —, pp. 95, 102; *Ast. Nach.*, no. 3124.
95. Note on the period of the fifth satellite of Jupiter. *Ast. Jour.*, vol. 12, p. 103.
96. Discovery of a comet by photography. *Mon. Not. R. A. S.*, vol. 53, p. 36. Nova Aurigæ. *Mon. Not. R. A. S.*, vol. 53, p. 35.
97. Note on the period and distance of the fifth satellite of Jupiter. *Mon. Not. R. A. S.*, vol. 53, p. 36.
98. East elongation of Jupiter's fifth satellite. *Ast. Nach.*, no. 3128.
99. Occultation of Mars and Jupiter by the moon in September (1892). *Ast. Jour.*
100. Some further observations of the fifth satellite of Jupiter. *The Observatory*, 1892, p. 425.
101. Observation of Comet *e*, 1892. *Ast. Jour.*, vol. 12, p. 157.
102. Holmes' comet. *S. F. Examiner.*
103. Holmes' comet. *Ast. Jour.*
104. Photographic and visual observations of Holmes' comet (*f*, 1892). *Ast. Jour.*, vol. 12, pp. 126, 127.
105. Filar micrometer observations of comet *f*, 1892 (Holmes, Nov. 6). *Ast. Jour.*, vol. 12, p. 149.
106. On the photographic discovery of comet *e* (October 12, 1892). *Observatory.*
107. Micrometer measures of the fifth satellite of Jupiter made with the 36-inch equatorial of the Lick Observatory. *Ast. Jour.*, vol. 12, p. 161.
108. The fifth satellite of Jupiter. *Blue and Gold*, 1893.
109. Filar micrometer observations of comets *g* and *f*, 1892, with the 12-inch equatorial of the Lick Observatory. *Ast. Jour.*, vol. 12, p. 175.
110. Remarkable transformation of Holmes' comet. *A. & A. P.*, 1893, p. 180.
111. Micrometrical observations of the satellite of Neptune made with the 36-inch refractor of the Lick Observatory. *Ast. Jour.*, vol. 13, p. 10.
112. Visual observations of Nova Aurigæ since its reappearance in August, 1892. *Ast. Nach.*, no. 3143.
113. Wind at the Lick Observatory. *A. & A. P.*, June, 1893, p. 573.
114. Chicago's great glass. *S. F. Examiner*, May 21, 1893.

WALTER CHARLES BLASDALE, B.S., Assistant in Chemistry.

1. On certain leaf-hair structures. *Erythea*, Dec., 1893.
2. The uredineæ of the San Francisco bay region. *Asa Gray Bulletin*, no. 3, 1893.
3. Studies in the life-history of a Puccinia found on the leaves of Œnothera ovata. Berkeley, 1893.

ELMER E. BROWN, Ph.D., Professor of the Science and Art of Teaching.

1. Die Stellung des Staates zur Kirche in Bezug auf den Religionsunterricht in der Schule (dissertation for the doctor's degree). Halle, Germany, 1890.
2. Democracy in the universities. Albany, New York, 1891.
3. Various articles published in educational periodicals, addresses included in the proceedings of educational bodies, and syllabi used in connection with class instruction.

S. W. BURNHAM, astronomer.

1. The solar corona, December 22, 1889. *An. An. of Photography*, 1891.
2. An examination of the place of Tycho Brahe's star. *Sid. Mess.*, vol. 9, p. 449.
3. Note on Hinds' variable nebula in Taurus. *Mon. Not. R. A. S.*, vol. 51, p. 94.
4. The proper motion of the components of 61 Cygni. *Sid. Mess.*, Jan., 1891, p. 1.
5. The proper motion of H 1968. *Mon. Not. R. A. S.*, vol. 51, p. 108.
6. OΣ 487. *Ast. Nach.*, no. 3017.
7. Note on the double star OΣ 15. *Ast. Nach.*, no. 3017.
8. The proper motion of Σ 547. *Observatory*, Jan., 1891, p. 56.
9. The companions of Aldebaran. *Mon. Not. R. A. S.*, vol. 51, p. 311.
10. Note on the double star Σ 186. *Sid. Mess.*, Feb., 1891, p. 72.
11. The orbit of κ Pegasi (β 989). *Mon. Not. R. A. S.*, vol. 51, p. 313.
12. Note on the orbit of Σ 2. *Knowledge*, Mar. 2, 1891, p. 48.
13. Gamma Andromedæ. *Sid. Mess.*, Mar., 1891, p. 118.
14. The proper motion of Σ 1321. *Sid. Mess.*, Apr., 1891, p. 168.
15. Sirius. *Mon. Not. R. A. S.*, vol. 51, p. 378.
16. Invisible double stars. *Mon. Not. R. A. S.*, vol. 51, p. 388.
17. The orbit of β Delphini (β 151). *Sid Mess.*, May, 1891, p. 215.
18. The orbit of OΣ 269. *Observatory*, 1891, p. 263.
19. The orbit of OΣ 285. *Sid. Mess.*, June, 1891, p. 273.
20. Measures of the stars noted as double in Krueger's catalogue.
21. The motion of 20 Draconis. *Mon. Not. R. A. S.*, vol. 51, p. 459.
22. The motion of the double star β 612. *Sid. Mess.*, Aug., 1891, p. 323.
23. The companions of Regulus. *Mon. Not. R. A. S.*, vol. 51, p. 460.
24. The companion of Alpha Ursæ Majoris (β 1077). *Knowledge*, vol. 14, p. 129.
25. Notes on the double stars of the Uranometria Argentina. *Ast. Jour.*, vol. 11, p. 21.
26. The camera for celestial photography. *Sid. Mess.*, 1891, p. 325, and *Anthony's Annual of Photography*, 1891.

27. New binary star β 416 = Scorpii 185.
28. Measures of planetary nebulæ.
29. The development of photographic plates. *American Photo. Conference*, 1891.
30. Seventeenth catalogue of new double stars discovered at the Lick Observatory. *Ast. Nach.*, no. 3042.
31. The new binary star β 648. *Observatory*, 1891, p. 411.
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33. Measures of the binary star Σ 2367 with the 36-inch equatorial. *Ast. Nach.*, no. 3074.
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ALLEN L. COLTON, A.B., Assistant Astronomer.

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Professor Hilgard is preparing a report of his observations made on the agricultural colleges and experiment stations visited by him on the continent of Europe. This paper, which will form part of the general report of the College of Agriculture for the year 1892–93, is now in preparation.

C. B. HILL, Assistant Astronomer, and Secretary and Librarian of the Lick Observatory.

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EDWARD S. HOLDEN, A.M., LL.D., Director of the Lick Observatory and Astronomer.

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FINANCIAL STATEMENT.

NOTE.—The Act of the Legislature of the State of California, entitled "An Act to provide for the permanent support and improvement of the University of California by the levy of a rate of taxation and the creation of a fund therefor," approved February 14, 1887, contains the following provision:

Section 5. The money derived from said fund must be applied only to the support and permanent improvement of the University, and the Board of Regents must include in its biennial report to the Governor a statement of the manner and for what purposes the money was expended.

The following statement shows in outline the manner and purposes of the expenditures of the State University Fund for the fiscal years 1890–91, 1891–92, and 1892–93.

Statements showing these expenditures in detail are given in the Annual Report of the Secretary of the Board of Regents for the years mentioned, copies of which are sent herewith.

RECEIPTS.

	1890–91.	1891–92.	1892–93.
Cash on Controller's warrants	$102,434 52	$119,830 12	$115,575 06

DISBURSEMENTS.

	1890–91.	1891–92.	1892–93.
Advertising and printing	$276 20	$348 48	$340 15
Department of Botany	427 35	216 84	317 15
Department of Biology	267 80	802 31	636 02
College celebrations	401 55	677 30	1,082 45
College of Chemistry	17,557 31	16,983 88	16,334 63
College of Engineering	12,273 51	12,755 36	13,768 08
Equipment and repairs	6,730 29	7,959 51	4,706 44 3,245 64
Fuel	820 35	962 20	987 95
Incidental expenses	955 75		
Insurance	496 62	126 25	
Library	5,702 63	7,288 87	3,064 90
Lick Observatory	19,518 17	26,359 24	25,608 15
Department of Mineralogy	258 61	350 06	224 44
Department of Military Science			297 43
Museum	2,186 98	497 46	1,091 07
Official and lecturing expenses	1,113 30	2,084 18	2,008 82
Physical culture	3,935 00	2,813 13	4,711 74
Department of Physics	1,667 12	5,897 03	1,155 31
Postage	564 25	678 00	568 00
Rent of Board-room		408 00	408 00
Stationery	147 78	539 92	314 53
Telegraphing and expressage	447 48	442 50	541 88
University extension			83 35
University printing office	1,063 65	835 91	1,964 37
University site improvements	13,377 32	4,104 81	4,702 40
Water supply	2,245 50	1,680 88	2,412 16
Reserved for permanent improvements	**10,000 00**	**25,000 00**	**25,000 00**
Totals	$102,434 52	$119,830 12	$115,575 06

UNIVERSITY OF CALIFORNIA.

BIENNIAL REPORT

OF THE

PRESIDENT OF THE UNIVERSITY

ON BEHALF OF THE BOARD OF REGENTS,

TO

HIS EXCELLENCY THE GOVERNOR OF THE STATE.

1894.

SACRAMENTO:
A. J. JOHNSTON, : : : : SUPERINTENDENT STATE PRINTING.
1895.

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REPORT OF PRESIDENT OF THE UNIVERSITY.

Berkeley, California, September 20, 1894.

To His Excellency H. H. Markham, *Governor of the State of California:*

Sir: The last "biennial report" of the Regents of the University, which was for three years instead of two, brought the history of the institution up to the autumn of 1893. Another report is due this year, and may be comparatively brief.

The growth of the University has been this year even more remarkable than in the three years preceding. The following table shows the number of students in attendance in the various departments for the years 1890–91, 1891–92, 1892–93, 1893–94, and for the beginning of the year 1894–95:

	1890–91.	1891–92.	1892–93.	1893–94.	1894–95. To Nov. 26.
In Academic Departments at Berkeley:					
Men	352	383	446	541	676
Women	105	164	204	274	351
Totals	457	547	650	815	1,027
At the Lick Observatory:					
Men	3	4	6	5	6
Women	0	0	0	2	2
Totals	3	4	6	7	8
In the Colleges of Law, Medicine,* Pharmacy, and Dentistry, and in the Mark Hopkins Institute of Art, in San Francisco:					
Men	302	378	415	474	545
Women	9	12	20	92	105
Totals	311	390	435	566	650
Total in the University (deducting for duplicates)	771	941	1,091	1,383	1,685

*Including the Post-Graduate Medical Department.

The numbers graduated from the several Colleges during 1894 have been as follows:

1894.	Colleges of General Culture.	Colleges of Applied Science.	Law.	Medicine.	Pharmacy.	Dentistry.	Totals.
Men	47	23	30	28	21	18	167
Women	33	1	0	3	1	0	38
Totals	80	24	30	31	22	18	205

The large increase in the number of students has necessitated a further increase of the teaching force. The following table gives a comparative view of the last few years:

Table showing the Number of Professors, Associate Professors, Assistant Professors, Lecturers, Instructors, Assistants, and Fellows in the Colleges at Berkeley during Each Academic Year—Compiled from the Annual Registers.

Year.	Professors.	Associate Professors.	Assistant Professors.	Lecturers.	Instructors.	Assistants.	Fellows.	Totals.
1890–91	17	5	5	2	8	11	--------	48
1891–92	17	8	8	--------	13	12	2	60
1892–93	16	9	10	1	19	18	4	77
1893–94	17	9	12	--------	20	23	7	88

Among the new accessions to the Faculty, the following may be noted:

In the Department of Greek, Professor Edward B. Clapp, late of Yale University.

In the Department of Latin, Professor Wm. A. Merrill, late of the University of Indiana.

In the new Department of Semitic Languages and Literature, Dr. Jacob Voorsanger, who offers his services as Professor gratuitously, until the department can be put on a more substantial foundation.

Associate Professor Henry T. Ardley, late of the University of Minnesota, has begun work in the new Department of Decorative and Industrial Art.

Assistant Professor H. P. Johnson takes the place of Professor Ritter, who is absent for a year's study in Europe.

Dr. Thos. P. Bailey, Jr., Ph.D., of Johns Hopkins, has been added as Assistant Professor to the Department of Pedagogy.

Mr. A. P. Hayne, a graduate of this University, has become Instructor in Viticulture and Olive Culture.

Mr. E. B. McGilvary, A.M., of Princeton, is a new instructor in English.

Additional instruction has been provided in the Departments of Mathematics, Romance Languages, and Drawing.

Associate Professors Jones, Bradley, and Paget have been made Professors in their respective departments.

Professor Greene is spending part of a year abroad, expecting to resume work at home in January, 1895. Dr. Joseph Le Conte attended the August meeting of the American Association for the Advancement of Science, in the City of Brooklyn, and helped to secure a favorable decision for San Francisco as its place of meeting in 1895.

As in the preceding years, Summer Schools were held in the University buildings in the vacation months of this year, by the following departments: In Physics, under the immediate supervision of Instructor Raymond. In Chemistry, under Instructor Sharwood. The railway disturbances defeated certain plans for summer work and observation in the Engineering, Mining, and Geological departments. According to the matured Announcements of Courses, the summer vacation will, as a rule, be utilized by the Technical Colleges for important supplementary work.

The College of Agriculture has continued its work of instruction, correspondence, attendance at Farmers' Institutes, and coöperation with fruit-growers, dairymen, and others. The Experiment Stations have been kept up as usual. The Forestry Stations, turned over to the University by the last Legislature, need a larger allowance than the small sum then appropriated.

The plant-house, for which plans were made several years since, has now come to erection, on the hill sloping down from the Students' Observatory. Its ample spaces will soon be ready for occupation.

A voluminous report of the most important work of the different branches of the Agricultural Department is now in the hands of the printer. It contains observations made by Professor Hilgard during his recent year's absence in Europe; a full report of much laboratory work in analyses of soils, fertilizers, fruits, sugar-beets, etc.; a careful treatise on olive culture; a report on Forestry Stations; and a treatment of many other subjects.

The Department of Mechanical Engineering is now housed in the fine new building put up in 1893. One portion is devoted to electrical engineering, which is now well provided for, both in instruction and in equipment. The full equipment of the building, which is expected to furnish light and power to other buildings, will still be a heavy draft on the ordinary resources of the University.

The Civil Engineering Department is occupying the old mechanical rooms. Its laboratory is fitted up with new machinery for testing the strength of materials used in engineering and architectural construction.

In the Chemical Laboratory there has been an urgent call for help in carrying out the law for the prevention of frauds in olive oil. The Legislature might well make an appropriation for the execution of the law, as the ordinary force in the University laboratory is insufficient to perform the required extra labor. Calls are made upon the department for analyses of water in many different localities. Some of these calls are for public institutions managed by the State; some for municipalities, in the interest of proper sanitation; others for private individuals. But these last raise questions of a sanitary and economical character which affect whole localities.

The Chemical Department is also looked to for analyses of various articles of food, and of commercial medicines and tonics, to detect the numerous frauds by adulteration. It is in the interest of the State to care for the health and the safety of all its citizens. It seems reasonable, therefore, that special arrangements for sanitary advice should be made at the State University, and that a special appropriation should be made for the extra labor imposed on the laboratories.

The Register for the University year 1893–94 was unusually late in appearing, the delay being chiefly due to very considerable changes in the curricula of the several Colleges at Berkeley. It was a year of reconstruction. An important addition to the general courses of instruction was made by the establishment of a College of Natural Sciences. The new College of Social Sciences includes the lines of work before taken in the Literary Course and the Course in Letters and Political Science. The College of Letters, whose name is fixed by the Organic Act, stands now by itself as giving the Classical Course leading to the degree of A.B.

In all these general colleges only half the work is prescribed. One quarter is assigned to group electives, for the study of connected subjects. The remaining quarter is open to free electives entirely at the choice of the student. As was remarked in the last report, this distribution of work seems to be a satisfactory adjustment of the claims of prescribed and elective studies. The experience of the year is in favor of the new organization. With an antecedent choice between so many courses, and with so large an element of subsequent election, no student can reasonably complain that he is shut up to a distasteful curriculum.

The College of Chemistry has also recast its course in such a way as to make half the work elective. The College of Agriculture approaches the same adjustment.

The three Engineering Colleges find it still necessary to prescribe more than half the work; but their curricula have been recast, with a gain in unity, simplicity, and efficiency.

The courses in the Colleges of Letters, Social Sciences, and Natural Sciences have been maintained with increasing vigor, and are taken by a large majority of the students. It is felt that the four years of general study are not too long a preparation for any of the professions which call for intellectual training.

The members of the Faculty at Berkeley continue to give free instruction in a limited number of University Courses at the Mark Hopkins Institute of Art in San Francisco. The lecturers for the year 1893–94 were as follows: In the first half-year, Professor Stringham, Assistant Professor Plehn, and Mr. Syle; in the second half-year, Professor Stringham, Associate Professor Richardson, and Mr. Armes. For the first term of 1894–95, Professors Le Conte and Clapp and Assistant Professor Sanger are already announced. Other Extension Courses have been given, as follows: In Los Angeles, by Professor Gayley; in Sacramento, by Professor Gayley and Assistant Professor Plehn; in San José, by Associate Professor Bacon; in Ventura, by Professor Moses.

The calls for Extension Courses are more than the Faculty can meet, without interfering with their work at Berkeley. We look forward to the time when our teaching staff can be so increased as to justify a greater expansion of our Extension work.

Attention is called to the announcement in the last report, that except in the University's homes, in Berkeley and San Francisco, the responsibility for organizing Extension Courses, and providing for the necessary expenses, will be thrown upon the "local centers." Inquiries in regard to such courses should be addressed to our Extension Secretary, Mr. Wm. D. Armes.

The list of accredited schools has increased to 48 (for 1893–94). For an account of our method, and its resulting benefits, see page 13 of the last report.

Entrance examinations must, of course, be continued, for candidates not coming with suitable recommendations from accredited schools. These examinations have not been impaired in point of thoroughness by the growth of the accrediting system.

Examinations were held this year away from Berkeley, at the following points in the State: Los Angeles, Grass Valley, Chico, Visalia, and Nordhoff.

In the spring of this year the President of the University invited the Principals of high schools and accredited private schools, and City and County Superintendents, to meet the Professors and Instructors of the University for a conference on questions of mutual interest. The invitation met with a favorable response, and a goodly number became, for the day, May 5th, the guests of the President. There was a free discussion of the subjects brought before the conference, and the proceedings were interesting and profitable. To secure more permanent results from the meeting, a committee was authorized to report on the courses of study in our secondary schools. That committee, consisting of Principals W. F. Hall and T. L. Heaton, and Professor F. Slate, has prepared a report which is of so great value that I include it in the appendix to this Biennial Report. The Chairman, Principal Hall, has diligently gathered and collated the facts pertaining to the instruction in our secondary schools.

Reports from the Deans of our Professional Colleges will be found in subsequent pages. These colleges, located in San Francisco, have continued to increase in numbers.

The Hastings College of the Law requires of candidates for admission the same group of subjects as those which are accepted for a limited course in the Academic Department; but more subjects are required.

After this year, the Medical Department will demand a high school or normal school standing of all applicants for admission. Four years of medical study will be required for graduation. Advanced standing, shortening the course one year, may be acquired by the completion of certain preparatory studies in a recognized university or college. The department has always been in the front rank in its requirements for graduation. This professional school is still suffering great injury from its insufficient accommodations. Its able Faculty attracts a goodly number of students; but it is greatly handicapped by the want of a building in a suitable locality. (See the statement of Dr. R. A. McLean in last year's report, and in the appendix to this report.)

The Post-Graduate Medical Department is fully organized, having a teaching staff of seventeen Professors, with over twenty clinical assistants.

The College of Pharmacy requires for a degree two full courses of lectures, and four years of experience in an accredited pharmacy.

The College of Dentistry, which is rapidly outgrowing its rooms, requires for graduation three years of dental study, including experience in all the usual branches of dental work.

The report of Director Holden gives a year's history of the Lick Observatory. More than five thousand visitors record their names every year at the Observatory, besides many who fail to register. The report shows that additional assistance is desired in various lines of astronomical work.

The University exhibit at the Midwinter Fair was in every way successful, and gave to many of our people a new estimate of the work of the State University. "University Day" was celebrated with much interest by the students, the alumni, and the friends of the University. It was graced with the presence of our Chief Magistrate, who presided at the evening banquet; and of distinguished military guests, who accorded high praise to the University Battalion.

The students of the University continue to merit commendation for their good conduct, their industry, and their loyalty. Their athletic sports and other recreations receive public notice in the newspapers; but the unrecorded phases of student life are the true tests of benefit received and time well spent. We are sure that our students will compare favorably with those of other institutions, for their earnestness of purpose and devotion to their proper work.

It should be generally known that a very considerable number of the students are making a fight for an education against the demon of poverty. Some of the very best scholars are without resources. Last spring, when three vacancies in the list of Hearst Scholarships were to be filled, there were over thirty applications from young women who were very highly recommended, to whom pecuniary assistance seemed absolutely necessary. Of the young men, a considerable number are working their way, and some are living on short rations. There is a Students' Aid Society, which is doing much to find places and work for those who are trying to support themselves. This deserving class of students is especially commended to the care of the community. Employment given them is a twofold benefit. Loan funds and scholarships would help many to finish their college courses, and to repay the benefaction by their useful and influential lives.

The needs of the University are still more imperative than at the date of the last report. The Library grows much too slowly for the growth of the University. Occasional donations are thankfully received; the latest being a gift from Mrs. Walsworth, of the large and well-selected private library of the late Rev. Dr. Edward B. Walsworth. For all the students in the general culture courses, the University Library is as important as are the laboratories for the students in applied science. The scientific side of the Library is also in much need of strengthening.

Several new lines of instruction claim immediate attention. The established courses in the fundamental studies are insufficiently manned. There is pressing need of a few endowments, to take a part of the expense of instruction. But the salary-roll could be more nearly provided for, if only we were relieved from the great burden of erecting new buildings.

Within the past few years the University has expended from its income, for new buildings and their equipment, about $180,000. The further equipment of the Mechanical building will cost a large additional sum. These improvements have been on the scientific side of the institution, and seemed indispensable. Of the buildings now in use only three and a half have been erected by legislative appropriations. The others have been a charge on University funds, or are due to private benefactions. The magnificent site of the University at Berkeley came to it without cost.

There is urgent need of the following new accommodations for the thousand students at Berkeley:

An Administration Building, furnishing a safe depository for our records, and leaving two suites of rooms, now occupied, to be turned into class-rooms.

An Assembly Hall for public gatherings. Our largest room will not hold the Freshman class of the current year.

A day-home for young women. Their present quarters are painfully inadequate. One hundred and twenty-five young women entered at the beginning of our new year.

Additions to the Library Building. Rooms are needed for special libraries, and for use by seminary classes. There is now a want of seating-room. Our Library is preëminently one for use, and hundreds of students meet there in the hours between their class-room exercises.

A Museum Building, with four times the space of the present rooms, and adjoining rooms for the three or four departments of science which are dependent on our collections for illustrative material.

An Armory Building with additional room for gymnasium practice. The present gymnasium is quite outgrown, and especially inadequate for the accommodation of the young women.

The doubling of our numbers within the past few years has made it impossible, from our stated income, to provide both for increased instruction and for additional room. It seems absolutely necessary that the State should come in to share the burden. In no other way can we fulfill our obligations to those whom we have invited to our University courses. It is gratifying to see them come: we are in honor bound to satisfy their just expectations.

I have not mentioned the pride of the State in seeing its highest school of learning take a proper rank among the universities of the land. Science and literature alike claim complete facilities for the best education of the modern time. In no way can our State more surely acquire a truly noble reputation, than by winning educational prominence. As Harvard is a chief glory of one State, and Yale of another, and Michigan of the State whose name it bears, so our own University, if wisely fostered and generously supported, may become one of California's highest and most enduring titles to honor among the commonwealths of America.

Subjoined are special reports from the Dean of the Colleges at Berkeley, from the Deans of the Professional Colleges, from the Director of the Lick Observatory, from the Secretary of the San Francisco Art Association, and from the Conference Committee spoken of on a preceding page.

A full list of the published writings of members of the Faculty, covering a period of three years, was printed in the last report. As but a single year has since elapsed, it is thought best to defer additional specifications till another report is issued. But it is due to a few who have come to us within the year, to name their printed productions.

The customary financial statement is also appended.

Respectfully submitted.

MARTIN KELLOGG,
President of the University of California.

SUBSIDIARY REPORTS.

Of the Dean of the Colleges at Berkeley.

Of the University Conference Committee.

Of the Director of the Lick Observatory.

Of the San Francisco Art Association.

Of the Dean of the Hastings College of the Law.

Of the Dean of the Medical Department.

Of the Dean of the Post-Graduate Medical Department.

Of the Dean of the College of Dentistry.

Of the Dean of the College of Pharmacy.

Published Writings of New Members of the Faculty.

Financial Statement.

REPORT OF THE DEAN OF THE COLLEGES AT BERKELEY.

To the President of the University of California:

Sir: I have the honor to submit herewith the following report on attendance and courses of instruction in the Colleges of Letters, Social Sciences, Natural Sciences, Agriculture, Mechanics, Mining, Civil Engineering, and Chemistry, for the academic year 1893–94.

The following table gives the number of students in attendance during the year, classified by status and by colleges. The upper figures on the left of each group refer to young men, the lower to young women; the numbers on the right side of each column are the totals:

Graduates.

Cand. Ph.D.	14 2 16	Cand. A.M.	10 4 14	Cand. M.L.	4 3 7	Cand. M.S.	2 0 2
		Graduates pursuing Special Subjects	13 12 25	Total	43 21 64		

Undergraduates.

	Seniors.	Juniors.	Sophomores.	Freshmen.	Students at Large.	Special Students	Limited Students	Totals.
Letters	13 5 18	9 6 15	8 2 10	15 5 20	9 8 17	6 5 11	0 2 2	60 33 93
Social Sciences	17 16 33	17 11 28	21 21 42	20 19 39	90 59 149	15 46 61	24 21 45	204 193 397
Natural Sciences	1 1 2	1 1 2	2 0 2	1 1 2	7 6 13	7 3 10	2 1 3	21 13 34
Agriculture	1 0 1	0 0 0	0 0 0	0 0 0	4 0 4	7 4 11	1 0 1	13 4 17
Mechanics	3 0 3	2 0 2	9 0 9	22 0 22	31 1 32	3 1 4	12 0 12	82 2 84
Mining	2 0 2	4 0 4	0 0 0	5 0 5	10 0 10	8 0 8	3 0 3	32 0 32
Civil Engineering	6 0 6	4 0 4	7 0 7	10 0 10	17 0 17	11 0 11	2 1 3	57 1 58
Chemistry	1 0 1	1 1 2	1 0 1	6 0 6	14 1 15	5 7 12	1 0 1	29 9 38
Totals	44 22 66	38 19 57	48 23 71	79 25 104	182 75 257	62 66 128	45 25 70	498 255 753

Total in the Colleges at Berkeley (deducting 2 for duplicates)	541 274 815

The staff of Instruction and Research consisted of ninety-seven persons, namely:

Professors	17
Associate Professors	9
Assistant Professors	12
Instructors	20
Department Assistants	37
Curators	2

The statistics of courses of instruction given, and of attendance in each course, are presented in the following table. In some of the very large classes the attendance varied considerably during the year, and for such classes the figures of the third column are only approximate:

COURSES OF INSTRUCTION GIVEN IN THE COLLEGES AT BERKELEY DURING THE YEAR 1893–94.

Instructor.	Title of Course.	No. of Hours a Week.		No. Students in Attendance.
		One Term	Two Terms	
	PHILOSOPHY.			
Howison; Stratton; Henderson	1. Formal Logic	4	------	47
Howison; Stratton; Henderson	2. Elementary Psychology	4	------	46
Howison; Stratton; Henderson; Henshaw	3. Introduction to Philosophy	4	------	34
Howison	4. Elementary Ethics, including Civil Polity	------	2	18
Howison	5. The Philosophy of Kant	------	2	15
Howison	7. The Philosophy of Plato	------	2	4
Howison	8. Hegel's Logic. Seminary	------	2	------
Howison	9. Teachers' Course: The Philosophy of Education	------	2	------
	PEDAGOGY.			
Brown; Miss Wertz	1. The Practice of Teaching	6	------	19
Brown	2. School Supervision	2	------	7
Brown	3. The History of Education: Earlier Periods	2	------	23
Brown	4. The History of Education: The Latest Period	2	------	30
Brown	5. The Theory of Education	3	------	13
Brown	7. Seminary for the study of special problems in Education	2	------	7
Brown	8. Graduate Seminary for the systematic study of child-life	------	------	------
	HISTORY AND POLITICAL SCIENCE.			
Bacon; Plehn	1. History of Europe during the Middle Ages	4	------	127
Bacon; Leach	2. Constitutional History of England	4	------	117
Bacon	3. History of Europe from the Reformation to the French Revolution	4	------	78
Bacon	4. Political History of the Nineteenth Century	4	------	73
Haynes	5. History of the English Colonies in America	4	------	------
Haynes	6. Political and Constitutional History of the United States	4	------	35
Haynes	7. The Constitution and Government of the United States	4	------	26
Plehn; Leach	8. Comparative Constitutional Law	4	------	50
Plehn; Haynes	9. Elementary Political Economy	4	------	82
Jones	10. Elements of International Law	2	------	40
Haynes	11. Economic History	4	------	6
Plehn	12. Local Government and Administration	4	------	------

Courses of Instruction—Continued.

Instructor.	Title of Course.	No. of Hours a Week.		No. Students in Attendance
		One Term	Two Terms	
Plehn	13. Finance and Taxation	4		20
Moses	14. Economic Theory	4		40
Jones	15. Roman Law	4		25
Jones	16. Jurisprudence	4		18
Moses	17. History of Political Theories	4		24
Jones	18. Constitutional Law of the United States		2	21
Moses	19. Political Science: Graduate Course			
Moses	20. Seminary: Economics and Politics		3	3
Moses	21. Spanish-American History	4		24
	Greek.			
Flagg	1. Twelve Books of Homer	3		43
Flagg	2. Two Books of Herodotus	3		34
Flagg	3. Greek Composition		1	18
Newsome	4. Plato, Sophocles	3		4
Clapp	5. Tragedy and Lyric Poetry	3		5
Clapp	7. Plato	2		9
Flagg	8. Euripides	3		6
Clapp	9. Aristophanes	2		
Clapp	11. Greek Seminary	2		4
	Latin.			
L. J. Richardson	1. Cicero and Nepos	3		78
Flagg; L. J. Richardson	2. Livy, Quintus Curtius; Plautus and Terence	3		67
L. J. Richardson	3. Latin Composition		1	56
Wentworth	4. The Odes and Epodes of Horace	3		36
L. J. Richardson	5. Selected Letters of Cicero and Pliny	3		20
G. M. Richardson	6. The Private Life of the Ancient Romans	1		9
G. M. Richardson	7. Latin Composition		1	11
G. M. Richardson	8. Tacitus: Agricola and De Oratoribus	2		9
Flagg	9. Cicero: Brutus and de Oratore	2		18
Kellogg	10. Tacitus: Germania and Agricola	2		3
G. M. Richardson	11. Cicero's Tusculan Disputations	1		2
G. M. Richardson	12. The Elegy: Tibullus and Propertius	3		7
G. M. Richardson	13. The Fasti of Ovid; Roman Mythology	3		7
G. M. Richardson	14. Horace: Satires and Epistles	3		3
Flagg	16. Cicero: Brutus	3		17
Flagg	17. Advanced Latin Composition		1	14
Flagg	19. Catullus	2		17
G. M. Richardson	21. Seminary: Ovid, Fasti	1		
G. M. Richardson	22. Seminary: the Pseudo-Vergilian Moertum	1		
G. M. Richardson	23. Graduate Course: Vergil, Bucolics	2		4
G. M. Richardson	24. Graduate Course: Juvenal	3		3
Kellogg	25. Linguistics	2		4
	English.			
Lange; Syle; Sanford	1. (a) Types of English Prose Style		3	235
	(b) Supplementary Reading		1	235
Armes	2. Practical Rhetoric and Summaries	5		177
Armes	3. (a) Shorter Course in Prose Style (b) An Outline of English Literature	4		87
Bradley	4. General History of English Literature		3	77
Lange	5. Old English	2		20
Lange	6. The Principles of Rhetoric	2		21
Lange	7. Poetics	2		34
Lange; Armes; Syle; Sanford	8. Themes. (a) Freshman year		1	180
	(b) Sophomore year		1	79
Lange	9. Old English Poetry	3		20
Armes	11. (a) Introduction to the English Drama	2		12
	(b) The History of the English Drama	2		13
Lange	12. Milton and His Contemporaries	3		
Bradley	13. The English Language and Grammar	2		9

COURSES OF INSTRUCTION—Continued.

Instructor.	Title of Course.	No. of Hours a Week.		No. Students in Attendance
		One Term	Two Terms	
Gayley	14. Oratorical Training. (*a*) Forensics	2	------	34
Syle	(*b*) Training in Oratorical Expression	2	------	34
Gayley	15. Problems of Literary Criticism	3	------	32
Bradley	16. Shakespeare	4	------	9
Syle	17. English Literature of the Eighteenth Century	3	------	3
Gayley	18. Poets of the Nineteenth Century	3	------	31
Gayley	19. The Best English Comedies	3	------	13
Bradley	20. The English Essayists	2	------	5
Lange	21. Advanced Old English: Beowulf	2	------	------
Gayley	27. The History of Æsthetic Consciousness	------	2	19
	GERMAN.			
Putzker; Senger	1. Introductory Course	------	4	120
Putzker	2. Schiller	------	4	76
Senger	3. Scientific German	------	2	16
Senger	4. Goethe	------	3	28
Putzker	5. Lessing	------	3	11
Senger	6. Composition and Conversation	------	2	6
Senger	7. Middle High German and Old High German	2	------	5
Senger	8. Gothic	2	------	3
Putzker	9. German Literature. Graduate Course	------	2½	------
	ROMANCE LANGUAGES.			
Paget; Howard	1. Introductory Course in French. Edgren's French grammar	4	------	132
Paget; Howard	2. Athalie. Le Roi des Montagnes at hearing	4	------	119
Paget; Huntington	3. A Tragedy of Corneille or Racine	3	------	99
Paget; Huntington	4. Two Dramas of Victor Hugo	3	------	96
Huntington	5. French Composition	------	1	8
Paget	6. Victor Hugo's Prose	------	1	30
Huntington	7. Lamartine's Poetry	------	1	12
Paget	10. French Literature in the first half of the Seventeenth Century	------	1	33
Huntington	13. Victor Hugo's Poetry	------	1	8
Paget	15. French Poets and Novelists of the Nineteenth Century	------	1	14
Huntington	17. General Survey of French Literature	------	1	------
Huntington	1. Spanish Grammar and Selections from Gil Blas	3	------	14
Huntington	2. Modern Spanish Novels	3	------	16
Howard	3. Don Quijote	------	2	9
Huntington	1. Italian Grammar and Modern Italian	------	2	2
Paget	2. Dante: La Divina Commedia	------	2	1
Paget	1. (*a*) Romance Philology: Phonetics and Study of Old Texts	------	2	1
	(*b*) French Literature	1	------	6
Paget	2. Spanish and Italian Literatures	1	------	1
	MATHEMATICS.			
Haskell; Pierce	A. Plane Trigonometry, Analytic Geometry, Algebra	------	5½	56
Stringham; Edwards; Haskell; Pierce; Hengstler	1. Plane Trigonometry	3	------	211
Edwards; Pierce; Hengstler	2. Plane Analytic Geometry	3	------	83
Edwards; Pierce	3. Solid and Spherical Geometry	2	------	62
Edwards; Haskell	4. Spherical Trigonometry	2	------	32
Edwards; Pierce; Hengstler	5. Algebra	4	------	192
Stringham	6. Propædeutic to the Higher Analysis	4	------	12

COURSES OF INSTRUCTION—Continued.

Instructor.	Title of Course.	No. of Hours a Week.		No. Students in Attendance.
		One Term	Two Terms	
Stringham	7. Logic of Mathematics	1	------	21
Edwards; Leuschner	8. Differential and Integral Calculus	4	------	52
Edwards; Leuschner	9. Analytic Geometry of Space	4	------	48
Edwards	10. Problems in the Differential and Integral Calculus	2	------	3
Edwards	11. Determinants and Theory of Equations	3	------	4
Haskell	13. Conic Sections: Advanced Course	3	------	4
Leuschner	14. Method of Least Squares	2	------	16
Leuschner	16. Interpolation and the Use of Tables	2	------	4
Edwards	18. Principles and Methods in Instruction	1	------	------
Stringham	19. Theory of Functions of Real Variables	------	2	1
Stringham	20. Differential Equations	3	------	10
Haskell	21. Theory of Algebraic Forms	3	------	2
Haskell	22. Higher Plane Curves	4	------	2
Haskell	25. Theory of Functions of a Complex Variable. Seminary	------	2	3
Stringham	26. Elliptic Functions	------	2½	1
Stringham	29. Partial Differential Equations, Fourier's Series, Spherical Harmonics	2	------	2
Stringham	31. Mathematical Seminary. Alternate Tuesday evenings	------	------	5
	PHYSICS.			
	1. General Physics. Lectures and recitations.			
Slate	(*a*) Heat, Light, Sound, and Electricity	------	3	38
Whiting	(*b*) Principles which underlie measurements in the physical laboratory	------	6	36
Whiting	2. Qualitative Physics	------	6	56
Slate	3. Advanced Physics	------	2	2
Drew	4. Elementary Physical Measurement (*a*)	3	------	21
Drew	Elementary Physical Measurement (*b*)	3	------	8
Drew	Elementary Physical Measurement (*c*)	3	------	1
Raymond	7. Electrical Measurements	4	------	5
Raymond	8. Advanced Physical Measurement	6	------	15
Slate	10. Reading and Discussions	------	6	2
	ASTRONOMY.			
Leuschner	1. Elementary Astronomy	------	3	26
Leuschner	2. Modern Astronomy	3	------	------
Leuschner	3. Supplement to Course 1: Practice in Observing	------	3	13
Leuschner	4. General Astronomy	------	1½	------
Leuschner	5. Practical Astronomy and Navigation—			
	(*a*) Recitation	------	1½	------
	(*b*) Practice in the Observatory	------	4	------
Leuschner	6. History of Astronomy	2	------	------
Leuschner	7. Advanced Practice	------	------	------
Leuschner	8. Theoretical Astronomy	3	------	------
Leuschner	9. Method of Least Squares	2	------	16
Leuschner	10. Interpolation and the Use of Tables	3	------	4
	CHEMISTRY.			
Rising; Sharwood	1. Elementary Chemistry—			
	Course A. Recitations and laboratory demonstrations	4	------	55
	Course B. Recitations and laboratory demonstration	3	------	18
Rising	2. Experimental Lectures on Inorganic Chemistry	------	3	61
Lenher	3. Laboratory: Qualitative Analysis	12	------	64
Rising	4. Laboratory: Quantitative Analysis	12	------	60
Lenher	5. Laboratory: Gravimetric Analysis	18	------	------
O'Neill; Blasdale	6. Laboratory: Volumetric Analysis	18	------	5

COURSES OF INSTRUCTION—Continued.

Instructor.	Title of Course.	No. of Hours a Week.		No. Students in Attendance
		One Term	Two Terms	
O'Neill	7. Organic Chemistry: Lectures, with experiments	------	2	18
O'Neill; Norris	8. Organic Chemistry: Laboratory. Supplementary to Course 7	18	------	13
Rising	9. Lectures on Theoretical Chemistry	------	2	4
O'Neill	10. Advanced Laboratory	18	------	9
	12. Selected Topics in Organic Chemistry	1	------	1
Rising; Lenher	13. Electrolysis	1	------	2
Rising; Lenher	15. Analysis of Iron, Steel, and Alloys	1	------	------
O'Neill	16. Physiological Chemistry—			
	(*a*) Lectures	2	------	9
	(*b*) Laboratory practice	3	------	9
O'Neill	19. Water Analysis	1	------	8
	23. Summer School of Chemistry. Six weeks, beginning with May 30, 1894	------	------	11
	Teachers' Course	------	------	1
	BOTANY.			
Howe	1. Vegetal Structure and Morphology	3	------	67
Greene	2. Systematic and Economic Botany	3	------	37
Greene	3. Advanced Systematic Botany	------	3	9
Greene	4. Medical Botany	------	3	------
Howe	5. Cryptogamic Botany	------	3	8
Howe	6. Vegetable Histology	6	------	7
Greene	7. The Phanerogamic Natural Orders	------	5	2
	GEOLOGY.			
Le Conte	1. General Geology	------	3	122
Lawson	2. Field Geology. Alternate Saturdays, both terms	------	------	4
Lawson	3. Petrography	------	1	4
Lawson	4. Petrographical Laboratory	------	3	------
Lawson	5. Graduate Course	------	------	7
	The Bulletin of the Department of Geology, issued from time to time, embodies, in the form of short papers or memoirs, the results of research by some competent investigator. Four numbers of the Bulletin were issued during the year 1893–94. The California Division of the United State Geological Survey has, since October, 1891, made the University its headquarters. A topographical survey of the region around the Bay of San Francisco has been in progress since that time, and a large section of the work has been completed. The results are embodied in contour maps on a scale of two inches to the mile, and contoured in great detail. These will form the basis of a geological map, to be prepared for the Geological Survey under the direction of the Geological Department of the University.			
	ZOÖLOGY.			
Le Conte	1. Comparative Zoölogy	------	2	118
Ritter; Holmes	2. (*a*) Morphology	------	7	17
Ritter; Holmes	(*b*) Morphology of Invertebrates	------	7	13
Ritter; Holmes	4. Structure and Affinities of the Mammalia	9	------	8
Ritter	5. Microscopical Anatomy	9	------	9
Ritter	6. Embryology	9	------	9

Courses of Instruction—Continued.

Instructor.	Title of Course.	No. of Hours a Week.		No. Students in Attendance
		One Term	Two Terms	
Ritter	7. Mammalian Morphology	4	------	22
Ritter	8. Seaside Laboratory. During the summer vacations instruction in animal biology is transferred to the seaside. In 1893 the laboratory was at Avalon, on the Island of Catalina.			
	Mineralogy.			
Lawson; Ransome	1. Mineralogical Laboratory	------	4	22
Lawson	2. Crystallography, Mineralogical Terminology, and Descriptive Mineralogy	------	2	11
	Mechanical Engineering.			
Slate	1. Analytic Mechanics	------	4	22
Hesse	2. Hydrodynamics	3	------	19
Hesse	3. Hydraulics and Hydraulic Machinery	3	------	5
Le Conte	4. Kinematics	------	2	5
Hesse	5. Thermodynamics	3	------	5
Hesse	6. Dynamics of Heat Engines	3	------	5
Hesse; Cory	7. Mechanical Laboratory: Experimental Engineering	------	6	------
Sladky; Le Conte	8. Mechanical Practice	------	6	18
Cory	9. Electrical Engineering—			
	(*a*) Electrolysis and Electro-Metallurgy; Primary and Secondary Batteries	2	------	4
	(*b*) Electro-Magnetism and Dynamo-Electric Machinery	2	------	4
	(*c*) Alternating Currents and Alternating-Current Machinery	2	------	3
	(*d*) Electricity in Engineering and Principles of Electrical Installation	2	------	4
	(*e*) Electrical Laboratory and Designing	------	6	2
	Civil Engineering.			
Randall	1. Surveying	4	------	20
Randall	2. Railroad Engineering	4	------	5
Randall; Burgess	3. Field Practice and Mapping	------	12	15
Soulé	4. Sanitary Engineering—			
	(*a*) Water supply	4	------	10
	(*b*) Ventilation of Dwellings and Sanitation of Cities	2	------	5
Soulé	5. Strength of Materials	4	------	41
Randall	6. Engineering Structures	4	------	9
Soulé	7. Engineering Specifications and Contracts	2	------	4
Soulé	8. Irrigation and Drainage	3	------	10
Soulé	9. Theory of Elasticity as applied to Materials of Construction	2	------	------
Randall	10. Highways and Pavements	2	------	------
Soulé	11. Engineering Materials	2	------	4
	Mining, Metallurgy, and Assaying.			
Christy	1. Lectures on Mining	------	4	9
Christy	2. Lectures on Metallurgy	------	3	11
Christy; Booth	3. Assaying. Lectures and Laboratory Practice	------	6	8
Christy; Booth	4. Metallurgical Laboratory	6	------	5
------	5. Ore Dressing	------	2	9
	Drawing.			
Burgess	1. Elements of Industrial Drawing	------	3	58
Kower	2. Descriptive Geometry	------	3	41
Burgess	3. Topographical and Structural Drawing	------	3	11
Kower	4. Mechanical Drawing	------	6	21

COURSES OF INSTRUCTION—Continued.

Instructor.	Title of Course.	No. of Hours a Week.		No. Students in Attendance
		One Term	Two Terms	
Kower	5. Graphical Statics	2	------	25
Kower	6. Construction. The designing of engineering structures and machines	------	9	18
Burgess	7. Free-hand Drawing	------	2	11
	AGRICULTURE, HORTICULTURE, AND ENTOMOLOGY.			
Hilgard; Loughridge	1. General Course in Agricultural Chemistry	------	3	9
Hayne	2. Vinification	2	------	-----
Jaffa; Colby	3. Agricultural and Viticultural Laboratory	------	15	11
Wickson	4. General Course in Agriculture and Horticulture	------	3	7
Hayne	5. Viticulture; Olive Culture	2	------	1
Woodworth	7. Elementary and Economic Entomology. Lectures and Practice	4	------	12
Woodworth	8. Apiculture. Lectures and Laboratory Practice	4	------	3
Woodworth	9. Parasitic Plant Diseases	------	3	11
Woodworth	10. Systematic Entomology	3	------	5
Woodworth	12. Entomological Laboratory	------	9	4
	MILITARY SCIENCE AND TACTICS.			
Winn	1. Practical Course: Infantry and artillery exercises, signaling, and band practice	------	2	337
Winn	2. Theoretical Course: Lectures and recitations	------	1	64
	PHYSICAL CULTURE.			
Magee; Selfridge	1. Elementary Course. 5 half-hours, both terms	------	------	175
Magee; Selfridge	2. Advanced Course. 5 half-hours, both terms	------	------	------
Magee	3. Elective Course for Young Women. 5 half-hours, both terms	------	------	------
	THE LIBRARY.			
Rowell	The Use of the Library: A short course of lectures at the opening of the Academic year.			

The following table gives such statistics as are at hand concerning University Courses at the Mark Hopkins Institute of Art, and University Extension Courses:

EXTENSION COURSES.

During the year 1893–94 the following courses were given:

In San Francisco.

(University Courses at the Mark Hopkins Institute of Art.)

First Term.

MATHEMATICS. The Logic of Mathematics: Geometry. Nine lectures by Professor Stringham.

POLITICAL ECONOMY. Introduction to Political Economy. Nine lectures by Assistant Professor Plehn.

ENGLISH. Poets and Dramatists of the Eighteenth Century. Nine lectures by Mr. Syle.

Second Term.

Mathematics. The Logic of Mathematics: Algebra. Nine lectures by Professor Stringham.

Latin. The Epistles of Horace: Translation and Exegesis. Nine exercises under the direction of Assistant Professor Richardson.

English. Poets of the Nineteenth Century. Nine lectures by Mr. Armes.

In Los Angeles.

English. The Development of English Comedy. Six lectures by Professor Gayley.

In Sacramento.

Political Economy. Economics of Industry. Nine lectures by Assistant Professor Plehn.

English. The Development of English Comedy. Six lectures by Professor Gayley.

In San Jose.

History. Napoleon and his Epoch. Six lectures by Associate Professor Bacon.

In Ventura.

Political Economy. Causes of the Present Social Unrest. Three lectures by Professor Moses.

PHYSICAL CULTURE.

The Instructor in Physical Culture, Mr. Magee, has handed me the following interesting account of the results of the systematic physical training now required of all male students during their first year's residence at the University:

During the past year, there has been in this department, the largest required attendance and the largest voluntary attendance, and the amount of benefit derived has been more satisfactory than in any previous year since its organization.

Physical Culture is compulsory during the first year of attendance at the University, and is subject to the following procedure: First, the physical examination and measurements of the student; second, prescription of work to meet the individual needs.

Each student is examined on entering the University and at the end of the prescribed course; also, in individual cases, at some intermediate point. The examination establishes a record of the name and age of the student, condition of health past and present, nature of diseases which he may have had, accidents, hereditary possibilities, and matters relating to personal hygiene. There are also recorded the weight, six items of height, twenty-seven girths, six breadths, seven lengths, five tests of strength, and lung capacity. The measurement of each student is compared with the average results of measurements made from 15,000 examinations of American college students, and determines how the individual deviates from this standard of the typical or average student.

As a result of the comparison the instructor is enabled to prescribe understandingly for the physical deficiencies of the student. For instance: Should a student have a history of consumption, the fact would be of sufficient importance to prescribe exercise for the thorough development of the chest, and to avoid any exercise which would have a tendency to aggravate the disease; or if the student is found to have other organic trouble, he is advised to take such work on the developing appliances as will meet these conditions. The results obtained seem to thoroughly advocate the wisdom of the methods. If, however, the student has no organic trouble—his muscles being equally distributed, though deficient—he is assigned to general or class work, which consists of setting-up exercises, dumb-bells, bar-bells, chest weights, Indian clubs during the first term, and parallel bars, horse-mat work, and horizontal bar during the second term. The following table shows the results of the past year's work:

1893–94.	Average of 15,000 students of Yale, Amherst, and Cornell.	University of California on entering. Class of '97, 160 students.	University of California, 124 students after 1 year of prescribed work. Class of '97.	Average increase of 124 students, or those who completed the prescribed work. Class of '97.
Weight (in kilogrammes)	61.2	60.7	62.9	2.2
Height (in millimeters)	1,725	1,719.1	1,725.4	6.3
Girths.				
Neck	349	344.8	356.1	11.3
Chest, repose	880	842.7	866.4	23.7
Chest, inflated	927	898.7	960.7	62
Right thigh	517	503.6	519.1	15.5
Left thigh	512	497.1	515.3	18.2
Right calf	359	345.1	352.1	7
Left calf	349	341.6	346.4	4.8
Right upper arm	295	291.6	304.9	13.3
Left upper arm	291	282.7	296.5	13.8
Right forearm	267	262.9	270	7.1
Left forearm	261	258	264.1	6.1
Strength (in kilos).				
Back	137	121	136.8	15.7
Legs	166	184	222	38
Upper arm	80	78.3	120.4	42.1
Forearm	40	41	41.5	.5
Lung capacity (in liters)	3.7	3.6	4.3	.7

Very respectfully submitted,

IRVING STRINGHAM,
Dean.

COURSES OF STUDY IN SECONDARY SCHOOLS.

REPORT OF THE COMMITTEE OF THE CALIFORNIA HIGH SCHOOL CONFERENCE.

In order to procure material for this report, the committee sent a request for courses of study to all the secondary schools in the State. Inclosed was a report blank asking specific questions covering matters of detail and individual opinion not likely to be found in the courses of study. The greatest difficulty has been experienced in securing anything like complete reports. In some instances, after writing again and again, the committee has failed to elicit any response whatever, while in other cases returns were received so late that it was necessary to rewrite entirely a large part of this report. If errors have crept in they may be traced largely to this cause.

In the different tables the varying numbers given for schools represented is due to the fact that some of the Principals left a part of the questions unanswered, or answered them so vaguely that it has been necessary to indicate results in a general way for such schools, or leave them out altogether on the points in question.

There are eighty-two High Schools in the State; seventy-one of these sent reports, and of the seventy-one, fifty-eight sent courses of study also. The thirteen High Schools sending no report and the thirteen sending reports but no courses of study are nearly all small schools, and would probably offer no types which would essentially modify the statistics given. Of the private schools, only those already accredited to the University, or likely soon to become so, were asked for data. Eight out of ten of these institutions have sent reports, and seven have forwarded courses of study.

For purposes of comparison, reports and courses have been asked from a small representative group of Eastern schools, widely scattered and representing the more progressive sections of the Eastern and Middle States.

The order of arrangement of topics has been as follows:

1. High Schools:
    (*a*) Reports;
    (*b*) Courses of Study.
2. Private Secondary Schools:
    (*a*) Reports;
    (*b*) Courses of Study.
3. State Normal Schools:
    Answers to questions 16, 17, 18 of report.
4. Group of Representative Eastern Schools:
    (*a*) Reports;
    (*b*) Courses of Study;
    (*c*) Quotations from Announcements, Courses of Study, and Letters.
5. Summary.

The report blank covered the following questions:

1. Name of school.
2. Location.
3. When organized.
4. Number of teachers engaged in secondary work.
5. Denote each teacher by a letter (to avoid names), and classify by entering the letters on the proper lines below.
   College graduates.
   Normal School graduates.
   Graduates of both Normal School and College.
   Graduates of neither.
   Having taught three years (or more) in secondary schools.
   Having taught less than three years in secondary schools.
   Having experience in Primary and Grammar School work.
6. Number of students in secondary school-work: Boys, —; girls, —.
7. Number in last graduating class: Boys, —; girls, —.
8. From last two graduating classes, number that have attended some institution of higher learning: Boys, —; girls, —.
9. Number of months per year that your school is in session.
10. Average length of your recitation periods, — minutes. Note any marked exceptions.
11. Requirements for admission to your school, when preliminary examination is given.
12. Number of years of school-work preparatory to your school.
13. Do you graduate students who pursue an irregular course on the same footing with those who are regular?
14. What subjects are optional for your students?
15. What fraction of the time assigned to the subject is given to laboratory work in Physics? in Chemistry?
16. Underscore subjects in the following list, which, in your judgment, should have a place in the programmes of secondary schools: Botany, Zoölogy, Geology, Astronomy, Plane Trigonometry, Advanced Algebra, Political Economy, Business Course (so called).
17. Would you begin secondary school work in mathematics with Algebra or with Elementary Concrete Geometry?
18. Do you consider it best to begin secondary science work with easy generalization over the science of common things, and specialize afterwards into the various branches of the subject; or would you first take up separately the special subjects, and generalize later?

1. HIGH SCHOOLS.

(*a*) Reports—(71 schools).

(1) *Organization*—69 reporting.

Dates from 1855 to 1893, with 48 schools in 1891–2–3; four of the latter, however, are cases of reorganization.

(2) *Teachers:*

13 schools have one teacher each; 24 schools have two teachers each; 34 schools have more than two teachers each.

Of the 44 schools started in the years 1891–2–3—

11 schools have one teacher each; 22 schools have two teachers each; 11 schools have more than two teachers each.

Several of these newly organized schools have not full classes in operation, so have not yet their full teaching force.

Total number of teachers	274
College graduates	63 per cent.
Normal School graduates	21 per cent.
Graduates of both Normal School and College (previously counted under both heads)	7 per cent.
Graduates of neither	23 per cent.
Graduates of either Normal School or College	77 per cent.
Having taught three or more years in secondary schools	74 per cent.
Having taught less than three years in secondary schools	26 per cent.
Having experience in Primary and Grammar School work	74 per cent.

The object of the form of the question was to try to discover what number of Normal graduates in a measure made up by experience for lack of training.

(3) *Pupils:*

(*a*) Enrolled:

Boys	3,014; or 41 per cent.
Girls	4,359; or 59 per cent.
Total	7,373

Average to each teacher, 28+.

NOTE.—One half of total number are in the cities of San Francisco, Alameda, Sacramento, Stockton, Fresno, and San José. The schools having more than two teachers show an average of thirty pupils to the teacher. More exactly, they have 6,028 pupils and 204 teachers. In Los Angeles and Oakland the ratio is 1 teacher to 29 pupils; Sacramento, 1 to 30; San Francisco, 1 to 41.

(*b*) Last Graduating Class:

Boys	357; or 39 per cent of total number graduating.
Girls	548; or 61 per cent of total number graduating.
Total	905

NOTE.—Many of the schools were organized so recently that they have not yet been able to send out full classes. Twenty-three did not graduate any pupils last year.

(*c*) From last two graduating classes, number that have attended some institution of higher learning:

Boys	284; or 56 per cent of total below.
Girls	221; or 44 per cent of total below.
Total	505

Assuming that one half of these were from last year's class, 40 per cent of the boys and 20 per cent of the girls, or 28 per cent of pupils graduating, attended some institution of higher learning. Again:

Schools reporting 2,449 boys and 3,673 girls, or a total of 6,122 pupils in attendance, would give 1,084 boys and 1,633 girls graduating in three and four years, according to their respective courses of study, and on the assumption that they would average each year the same number of graduates as in 1893. Actual figures would exceed this estimate. From these figures we get—

44 per cent of the boys in attendance graduate;
44 per cent of the girls in attendance graduate;
or 44 per cent of the pupils graduate.

Now, since 40 per cent of the boys and 20 per cent of the girls graduating attend higher institutions, it may be shown that from the High Schools—

18 per cent of the boys in attendance go higher after graduating, and
9 per cent of the girls do the same;
or, 12 per cent of the total number of pupils enrolled go to higher institutions.

(4) *Recitation Periods:*

(*a*) Average .... 41 minutes.
(*b*) By the number of teachers—

Schools of 1 teacher, average period	34 minutes.
Schools of 2 teachers, average period	41 minutes.
Schools of 3 teachers, average period	43 minutes.
Schools of 4 teachers, average period	44 minutes.
Schools of 5 teachers, average period	43 minutes.
Schools of 6 teachers, average period	45 minutes.
Schools of 7 teachers, average period	46 minutes.
Schools of 8 teachers, average period	42½ minutes.
Schools of 14 teachers, average period	45 minutes.
Schools of 23 teachers, average period	45 minutes.
Schools of 24 teachers, average period	55 minutes.

Whilst it is true that there is a gradual increase in length of period with increased number of teachers, this may be more than counterbalanced by the smallness of the classes in the schools having only one or two teachers.

(5) *Marked Exceptions to Average Recitation Period:*

In favor of—

Physics and Chemistry	11 schools.
English	3 schools.
History	1 school.
Mathematics	4 schools.
Latin	1 school.

Against—

English	2 schools.
Commercial Law	1 school.
Commercial Arithmetic	1 school.
Physical Geography	1 school.
Zoölogy	1 school.

And a few subjects, on account of smallness of classes.

(6) *Requirements for Admission:*

The usual grammar grade studies	67 schools.
Same as requirements for Eighth Grade	1 school.
Proof of ability to carry the work; no definite requirements	3 schools.

(7) *Number of Years Preparatory to High School:*

Seven years	2 schools.
Eight years	36 schools.
Nine years	26 schools.
Ten years	2 schools.
No report	5 schools.

Average, 8.4 years.

(8) *Number of months to the year:*

Ten and one half months	1 school.
Ten months	45 schools.
Nine and three fourths months	1 school.
Nine and one half months	4 schools.
Nine months	19 schools.
No report	1 school.

Average, 9.7 months (4 weeks each).

NOTE.—There is an element of uncertainty here, because some of the schools reporting ten months really have 42 weeks, if holidays and Institute week are counted, as is usually done.

(9) *Question 13 of Report:*

No	53 schools.
Yes	15 schools.

(10) *Question 14 of Report:*

Everything optional if approved by Principal	3 schools.
Everything optional except English	1 school.
Everything optional except one year English	1 school.
Everything optional except minimum Mathematics	1 school.
No options except in courses	26 schools.

In others, options mostly between Languages and Sciences.

(11) *Question 15 of Report:*

(*a*) For Physics, ranges from none to all, with an average of $\frac{49}{100}$. 62 schools have laboratory work.

(*b*) For Chemistry, ranges from none to all, with an average of $\frac{53}{100}$. All but one having the subject have laboratory work.

(12) *Question 16 of Report:*

Botany	58 schools.
Zoölogy	45 schools.
Geology	30 schools.
Astronomy	29 schools.
Plane Trigonometry	39 schools.
Advanced Algebra	25 schools.
Political Economy	43 schools.
Business Course	27 schools.

(13) *Question 17 of Report:*

Algebra	34 schools.
Elementary Concrete Geometry	31 schools.
Both together	2 schools.
Elementary Geometry should be in Grammar Schools	6 schools.

(14) *Question 18 of Report:*

In favor of generalization first	26 schools.
In favor of specialization first	40 schools.
No report or non-committal	5 schools.

NOTE.—These figures cannot, however, be considered as settling anything very definitely, for there is evidence in many reports that the writer did not get the meaning intended by the question.

(15) *Specific recommendations* were given in several cases, often quite contradictory in character.

One Principal writes: "The friends of education have admitted to the course of study subjects that do not belong in the secondary schools, simply because, without them, the number of pupils would be greatly reduced and strong opposition to the schools would be developed. I am certain that this High School can be sure of support in no other way. For this reason I approved a 'Business Course.'"

Another says: "Political Economy, all ought to study. Its fundamental principles are easily understood and provide an effective safeguard against the nostrums of some of our financial reformers. No 'Business Course' or other nonsense."

Then comes another, who says: "We must not lose sight of the fact that our secondary schools are not, and never will be, rightly, preparatory schools."

A fourth does not quite agree, for he says: "A High School will fail or accomplish little in a community if it allows its work to be considered final. Its main work is to stimulate to higher courses."

A fifth agrees with the last, but he is working under difficulties which many will appreciate. He says: "I wish to inspire pupils with a desire for university education. My board is not with me in this."

One of the Principals would substitute Botany for Chemistry, on the ground that it is the more inductive science. He says: "Absolutely nothing is presupposed in Botany, while much is presupposed in Chemistry."

(*b*) COURSES OF STUDY—HIGH SCHOOLS.

Thirty-nine High Schools have a three-years' course, nineteen have one covering four years, while the courses of two schools are so arranged that they may be completed in either three or four years, according to the mental energy of the student. These three- or four-year schools are counted in the four-year class. Most California High Schools are twelve-year schools. The exceptions are mostly toward eleven, though one or two have thirteen years, all told. The twelve years, as an average, seem to be divided practically into eight and one half years for the work of the elementary school and three and one half years for that of the secondary school.

Only fifty-eight High Schools sent courses of study, and some of these are so indefinite in details that it has been difficult to specify quantity and time for given subjects. The statistics gleaned from the various courses have been arranged under the heads: "What?" "When?" "How Long?"

What? Fifty-eight schools.

Mathematics—

Algebra	58 schools.
Plane Geometry	58 schools.
Solid Geometry	32 schools.
Arithmetic	32 schools.
Plane Trigonometry	25 schools.
Elementary Concrete Geometry	13 schools.
Elementary Algebra	7 schools.
Advanced Algebra	5 schools.
Spherical Trigonometry	1 school.
Analytical Geometry and Surveying	1 school.

Science—

Physics	58 schools.
Chemistry	54 schools.
Botany	40 schools.
Zoölogy	28 schools.
Physical Geography	30 schools.
Astronomy	22 schools.
Physiology	17 schools.
Geology	13 schools.
Natural History	2 schools.

History and Political Science—

Civil Government	52 schools.
Ancient History	51 schools.
Mediæval History	49 schools.
United States History	16 schools.
Political Economy	15 schools.
General History	9 schools.
English History	7 schools.
Comparative Government	1 school.

English—

Literature (probably biographical and historical)	10 schools.
Technical English Grammar	18 schools.
Rhetoric	38 schools.
Thackeray's Newcomes	27 schools.
Classic Myths (or equivalent)	32 schools.
Burke's Orations (or equivalent)	32 schools.
Julius Cæsar	29 schools.
Merchant of Venice	27 schools.
Milton's Comus	20 schools.
Evangeline	11 schools.
Snow-Bound	20 schools.
Hales' Longer English Poems (or equivalent)	26 schools.
Vision of Sir Launfal	23 schools.
English composition (as a text)	9 schools.
Irving's Alhambra	26 schools.

What? English—Continued.

Lady of the Lake	18 schools.
Lay of the Last Minstrel	9 schools.
Sir Roger de Coverly	24 schools.
Some 28 classics, less than	5 schools.

NOTE.—So many schools reported "English" without specifying, that the above is not at all a full representation. In general, in accordance with the requirements of the State University, the schools all have the subjects and classics outlined above, with a few substitutions of options.

Latin	54 schools.
Greek	18 schools.
Modern Languages—	
French	12 schools.
German	27 schools.
Spanish	4 schools.
Miscellaneous—	
Bookkeeping	28 schools.
Drawing	19 schools.
Commercial Law	14 schools.

And 19 other subjects, from Mining to Agriculture, and from Psychology to Elocution, are presented by one or two schools each.

When?

Mathematics—		
Elementary Geometry	First year	11 schools.
	Second year	2 schools.
Elementary Algebra	First year	7 schools.
Algebra	First year	48 schools.
	Second year	8 schools.
	Third year	2 schools.
Plane Geometry	First year	7 schools.
	Second year	34 schools.
	Third year	17 schools.
Solid Geometry	Second year	2 schools.
	Third year	15 schools.
	Fourth year	15 schools.
Plane Trigonometry	Third year	12 schools.
	Fourth year	13 schools.
Advanced Algebra	Third year	3 schools.
	Fourth year	2 schools.
Arithmetic	First year	17 schools.
	Second year	11 schools.
	Third year	2 schools.
	Fourth year	2 schools.
Science—		
Physics	First year	5 schools.
	Second year	26 schools.
	Third year	23 schools.
	Fourth year	4 schools.

When? Science—Continued.

Chemistry	First year	3 schools.
	Second year	12 schools.
	Third year	27 schools.
	Fourth year	12 schools.
Botany	First year	26 schools.
	Second year	9 schools.
	Third year	4 schools.
	Fourth year	1 school.
Physical Geography	First year	18 schools.
	Second year	5 schools.
	Third year	7 schools.
Zoölogy	First year	12 schools.
	Second year	10 schools.
	Third year	4 schools.
	Fourth year	2 schools.
Astronomy	First year	2 schools.
	Second year	2 schools.
	Third year	13 schools.
	Fourth year	5 schools.
Physiology	First year	9 schools.
	Second year	6 schools.
	Third year	1 school.
	Fourth year	1 school.
Geology	First year	1 school.
	Second year	1 school.
	Third year	7 schools.
	Fourth year	4 schools.

History and Political Science—

Ancient History	First year	33 schools.
	Second year	17 schools.
	Third year	1 school.
Mediæval and Modern History	First year	27 schools.
	Second year	19 schools.
	Third year	3 schools.
General History	First year	8 schools.
	Second year	1 school.
English History	First year	1 school.
	Second year	1 school.
	Third year	5 schools.
History of United States	First year	7 schools.
	Third year	4 schools.
	Fourth year	5 schools.
Civil Government	First year	10 schools.
	Second year	2 schools.
	Third year	27 schools.
	Fourth year	13 schools.
Political Economy	Second year	3 schools.
	Third year	2 schools.
	Fourth year	10 schools.

When?—Continued.

English. (See note under "What.")

Literature	First year	2 schools.
	Second year	4 schools.
	Third year	2 schools.
	Fourth year	2 schools.
Technical English Grammar	First year	11 schools.
	Second year	5 schools.
	Third year	2 schools.
The Newcomes	First year	2 schools.
	Second year	6 schools.
	Third year	15 schools.
	Fourth year	4 schools.
Classic Myths (or equivalent)	First year	19 schools.
	Second year	10 schools.
	Third year	3 schools.
Burke's Orations (or equivalent)	Second year	1 school.
	Third year	20 schools.
	Fourth year	11 schools.
Rhetoric	First year	22 schools.
	Second year	10 schools.
	Third year	4 schools.
	Fourth year	2 schools.
Julius Cæsar	First year	1 school.
	Second year	15 schools.
	Third year	11 schools.
	Fourth year	2 schools.
Milton's Comus	First year	1 school.
	Second year	5 schools.
	Third year	11 schools.
	Fourth year	3 schools.
Evangeline	First year	10 schools.
	Second year	1 school.
Snow-Bound	First year	16 schools.
	Second year	3 schools.
	Third year	1 school.
Hales' Longer English Poems, or Syle's From Milton to Tennyson	Second year	9 schools.
	Third year	13 schools.
	Fourth year	4 schools.
Vision of Sir Launfal	First year	8 schools.
	Second year	10 schools.
	Third year	5 schools.
Merchant of Venice	First year	4 schools.
	Second year	16 schools.
	Third year	6 schools.
	Fourth year	1 school.
English Composition	First year	8 schools.
	Second year	1 school.
Alhambra	First year	18 schools.
	Second year	7 schools.
	Third year	1 school.

When? English—Continued.

Lady of the Lake	First year	15 schools.
	Second year	2 schools.
	Third year	1 school.
Sir Roger de Coverly	First year	8 schools.
	Second year	12 schools.
	Third year	4 schools.
Lay of the Last Minstrel	First year	4 schools.
	Second year	4 schools.
	Third year	1 school.

Languages:

Greek	First year	1 school.
	Second year	12 schools.
	Third year	5 schools.
Latin	First year	49 schools.
	Second year	5 schools.
French	First year	5 schools.
	Second year	4 schools.
	Third year	3 schools.
German	First year	13 schools.
	Second year	6 schools.
	Third year	8 schools.

In making the above table, it was impracticable to segregate into three- and four-year groups, so the figures can be taken as indicating when a subject is begun, counting from the beginning of the course; it may or may not be completed in the same year. If the figures of the third year are taken as indicating that a subject is commenced in the next to the last year, it must be borne in mind that there are chances in favor of its being the last instead, on account of the large number of three-year schools.

A year covering five recitation periods a week has been used as the unit of time in the following table:

How Long? In every case the maximum is taken.

English. Total average, 3.3 years.

2½ years	4 schools.
3 years	35 schools.
3½ years	2 schools.
4 years	15 schools.
5 years	2 schools.

Mathematics. Total average, 3.21 years.

Algebra—

1 year	15 schools.
1½ years	37 schools.
2 years	6 schools.

Average, 1.42 years.

Plane Geometry—

1 year	39 schools.
1½ years	16 schools.
2 years	3 schools.

Average, 1.19 years.

How Long? Mathematics—Continued.

Solid Geometry—

½ year	32 schools.

Average, ½ year.

Plane Trigonometry—

½ year	24 schools.
1 year	1 school.

Average, .52 year.

Arithmetic—

¼ year	2 schools.
½ year	23 schools.
1 year	6 schools.
2 years	1 school.

Average, .6 year.

Science. Total average, 3.2 years.

Physics—

1 year	50 schools.
1½ years	6 schools.
2 years	1 school.
2½ years	1 school.

Average, 1.09 years.

Chemistry—

¼ year	2 schools.
½ year	8 schools.
1 year	43 schools.
1½ years	1 school.

Average, .85 year.

Physical Geography—

¼ year	2 schools.
½ year	23 schools.
1 year	5 schools.

Average, .57 year.

Botany—

¼ year	1 school.
½ year	24 schools.
1 year	15 schools.

Average, .68 year.

Zoölogy—

¼ year	3 schools.
½ year	18 schools.
1 year	7 schools.

Average, .60 year.

Physiology—

¼ year	2 schools.
½ year	13 schools.
1 year	2 schools.

Average, .53 year.

Astronomy—

¼ year	3 schools.
½ year	16 schools.
1 year	3 schools.

Average, .53 year.

How Long? Science—Continued.

Geology—

¼ year	3 schools.
½ year	9 schools.
1 year	1 school.

Average, .47 year.

History and Political Science. Total average, 2.64 years.

History—

1 year	5 schools.
1½ years	10 schools.
2 years	24 schools.
2½ years	11 schools.
3 years	6 schools.
3½ years	2 schools.

Average, 2.08 years.

Science of Government—

¼ year	2 schools.
½ year	39 schools.
1 year	10 schools.
1½ years	1 school.

Average, .66 year.

Political Economy—

¼ year	3 schools.
½ year	11 schools.
1 year	1 school.

Average, .48 year.

Languages.

Latin—

2 years	2 schools.
3 years	40 schools.
4 years	12 schools.

Average, 3.19 years.

Greek—

1 year	1 school.
2 years	13 schools.
2½ years	2 schools.
3 years	2 schools.

Average, 2.11 years.

French—

2 years	8 schools.
3 years	3 schools.
4 years	1 school.

Average, 2.42 years.

German—

2 years	19 schools.
3 years	7 schools.
4 years	1 school.

Average, 2.33 years.

2. PRIVATE SECONDARY SCHOOLS.

(*a*) Reports—(8 schools).

(1) Organization. From 1866 to 1894.

(2) Teachers:

(*a*) Total	40
(*b*) College graduates	83 per cent.
(*c*) Normal School graduates	8 per cent.
(*d*) Graduates of both Normal School and College	5 per cent.
(*e*) Graduates of neither Normal School nor College	15 per cent.
(*f*) Graduates of either Normal School or College	85 per cent.
(*g*) Having taught three or more years in secondary schools	83 per cent.
(*h*) Having taught less than three years in secondary schools	17 per cent.
(*i*) Having experience in Primary and Grammar School work	78 per cent.

(3) Pupils:

(*a*) Boys enrolled	271
(*b*) Girls enrolled	1
(*c*) Average to teacher	8

Note.—It must be borne in mind here that all of the teachers are counted for full time, when, as a matter of fact, many of them devote but a part of the day to the school. Full time being counted, it is doubtful if so small a number of pupils to the teacher would appear.

(*d*) Last graduating class	56 per cent.
(*e*) From last two graduating classes, attending institutions of higher learning	69 per cent.

Assuming that one half of these were from last year's class, and taking into consideration only those schools which send complete reports, it is found that 67 per cent of the pupils graduating from private secondary schools afterward attended some higher institution. On the basis of four classes like those of 1893, 74 per cent of the total attendance will graduate. We then get 50 per cent as the part of the total attendance afterward going to college.

(4) Average length of school year	9.87 months.
(5) Average recitation period	40 minutes.

(6) Requirements for admission: Equivalent to the requirements of public schools for Grammar School diplomas.

(7) Question 13 of report: All answered "No."

(8) Question 14 of report: Options mostly in languages or courses.

(9) Question 15 of Report:

Physics	Average, $\frac{1}{2}$
Chemistry	Average, $\frac{3}{5}$

(10) Question 16 of Report (8 schools voting):

Botany	6 schools.
Geology	2 schools.
Plane Trigonometry	7 schools.
Business Course	4 schools.

(10) Question 16 of Report—Continued.

Zoölogy	4 schools.
Astronomy	1 school.
Political Economy	3 schools.
Advanced Algebra	4 schools.

(11) Question 17 of Report:

Algebra	4 schools.
Elementary Geometry	2 schools.
Both	2 schools.

(12) Question 18 of Report:

Easy generalizations first	4 schools.
Special subjects first	2 schools.
No report	2 schools.

(*b*) COURSES OF STUDY—(7 schools).

Of the seven schools sending programmes, five have four years in their courses and two have three years. So few schools are represented in this list that the statistics will be consolidated as much as possible.

(1) English. Total average time, 3.5 years.
Division of the subject practically as in the High Schools.

(2) Mathematics. Total average time, 3.53 years.
Algebra, 6 schools: all first year; average time, $1\frac{2}{3}$ years.
Plane Geometry, 6 schools: first year, 2; second year, 2; third year, 2; average time, $1\frac{1}{6}$ years.
Solid Geometry, 5 schools: third year, 2; fourth year, 3; average time, $\frac{1}{2}$ year.
Arithmetic, 5 schools: all first year; average time, $\frac{4}{5}$ year.
Trigonometry, 5 schools: third year, 1; fourth year, 4; average time, $\frac{1}{2}$ year.

NOTE.—One school gives time for Mathematics without specifying further.

(3) Science—(7 schools reporting). Total average time, 2.9 years.
Physics, 7 schools: first year, 1; second year, 3; third year, 1; fourth year, 2; average time, 1 year.
Chemistry, 7 schools: first year, 2; third year, 2; fourth year, 3; average time, 1 year.
Astronomy, 1 school: fourth year; average time, $\frac{1}{4}$ year.
Physical Geography, 3 schools: first year, 2; second year, 1; average time, $\frac{2}{3}$ year.
Physiology, 4 schools: all first year; average time, $\frac{3}{4}$ year.
Botany, 3 schools: all third year; average time, $\frac{5}{6}$ year.
Zoölogy, 2 schools: first year, 1; third year, 1; average time, $\frac{1}{2}$ year.

(4) History and Political Science. Total average time, 2.8 years.
Ancient History, 7 schools: first year, 2; second year, 3; fourth year, 2; average time, .96 year.
Mediæval and Modern History, 6 schools: second year, 1; third year, 2; fourth year, 3; average time, .92 year.
United States History, 5 schools: first year, 3; second year, 1; average time, .62 year.
Civil Government, 6 schools: first year, 1; third year, 4; fourth year, 1; average time, .58 year.
English History, 4 schools: first year, 1; second year, 3; average time, .75 year.

(5) Languages—

Latin, 7 schools; total average time, 3.6 years.
Greek, 6 schools; total average time, 2.42 years.
French, 4 schools; total average time, 2.13 years.
German, 4 schools; total average time, 2 years.

3. CALIFORNIA STATE NORMAL SCHOOLS. (3 schools.)

(*a*) Question 16 of Report:

Botany	2 schools.
Zoölogy	2 schools.
Geology	2 schools.
Astronomy (as an option with Geology)	1 school.
Plane Trigonometry	1 school.
Advanced Algebra	1 school.
Political Economy	2 schools.

(*b*) Question 17 of Report:

Algebra	none.
Elementary Concrete Geometry	3 schools.

(*c*) Question 18 of Report:

Specialization first	2 schools.
Generalization first	1 school.

4. GROUP OF REPRESENTATIVE EASTERN SCHOOLS.

(*a*) Reports.

(1) Organization:

	Date.
Roxbury Latin School, Roxbury, Mass.	1645
Phillips Exeter Academy, New Hampshire	1783
English High School, Boston	1821
Providence, R. I., High School, Classical Department	1843
English High School, Cambridge, Mass.	1847
Central High School, Grand Rapids, Mich.	1858
Central High School, Kansas City, Mo.	1868
Denver High School	1874
North Division High School, Chicago	1878
Washington, D. C., High School	1882
Hughes High School, Cincinnati	1885

(2) Teachers (11 schools):

Total number	283
College graduates	57 per cent.
Normal School graduates	19 per cent.
Graduates of both (counted in both)	6 per cent.
Graduates of neither	29 per cent.
Graduates of either Normal School or College	71 per cent.
Having taught three or more years in secondary schools	80 per cent.
Having taught less than three years in secondary schools	20 per cent.
Having experience in Primary and Grammar School work	39 per cent.

(3) Pupils:

Total attendance	8,118
Average to each teacher	29—

On the basis of four classes like those of last year—High Schools only—

54 per cent of those in attendance will graduate.
22 per cent of those graduating will go higher.
12 per cent of those in attendance will go higher.

Leaving out schools which have only boys, and keeping separate account of the sexes, we have—

37 per cent of total attendance are boys.
63 per cent of total attendance are girls.
33 per cent of the graduates are boys.
67 per cent of the graduates are girls.
62 per cent of those going higher are boys.
38 per cent of those going higher are girls.

Leaving out Exeter and Roxbury, and taking only High Schools—

35 per cent of the boys graduating go higher.
12 per cent of the girls graduating go higher.
52 per cent of the boys in attendance graduate.
56 per cent of the girls in attendance graduate.
18 per cent of the boys in attendance go to higher institutions.
7 per cent of the girls in attendance go to higher institutions.

(4) Average length of school year .... 9.8 months.
(5) Average length of recitation period .... 49 minutes.
(6) Question 11 of Report:
Equivalent of California Grammar Grade Diploma.
(7) Number of years preparatory 8.2
(8) Question 13 of Report:
No, 9; Yes, 2.
(9) Question 14 of Report:
As a rule, options are in courses rather than in subjects.
(10) Question 15 of Report:

Physics	54 per cent.
Chemistry	61 per cent.

(11) Question 16 of Report (11 schools voting):

Botany	10 schools.
Zoölogy	8 schools.
Geology	7 schools.
Astronomy	6 schools.
Plane Trigonometry	8 schools.
Advanced Algebra	8 schools.
Political Economy	8 schools.
Business Course	8 schools.

(12) Question 17 of Report:

In favor of Algebra first (But of these, 4 would have Elementary Concrete Geometry in Grammar School.)	5 schools.
In favor of beginning with Elementary Concrete Geometry in High Schools	3 schools.
In favor of carrying the two parallel	2 schools.
Both begun below	1 school.

(13) Question 18 of Report:

Beginning with easy generalizations	4 schools.
Beginning with special subjects	6 schools.
No report	1 school.

(*b*) Courses of Study—(9 schools; all 4 years).

(Cambridge and Cincinnati did not send courses.)

Mathematics, 9 schools; total average time, 3.34 years.
- Arithmetic, 6 schools: first year, 4; second year, 1; third year, 1; average time, .63 year.
- Algebra, 9 schools: first year, 8; second year, 1; average time, 1.16 years.
- Elementary Geometry, 2 schools: first year; average time, .7 year.
- Plane Geometry, 9 schools: first year, 1; second year, 5; third year, 3; average time, 1.03 years.
- Advanced Algebra, 5 schools: third year, 1; fourth year, 4; average time, .6 year.
- Plane Trigonometry, 8 schools: third year, 2; fourth year, 6; average time, .4 year.
- Solid Geometry, 6 schools; third year, 2; fourth year, 4; average time, .38 year.
- Analytical Geometry, 3 schools: fourth year; average time, .38 year.
- Surveying, 1 school: third year; average time, .5 year.
- Spherical Trigonometry, 1 school: fourth year; average time, .5 year.

Science, 8 schools; total average time, 3.88 years. (A classical department is dropped.)
- Physics, 8 schools: second year, 4; third year, 3; fourth year, 1; average time, .91 year.
- Chemistry, 8 schools: second year, 1; third year, 5; fourth year, 2; average time, .85 year.
- Astronomy, 4 schools: fourth year; average time, .42 year.
- Botany, 4 schools: first year, 3; third year, 1; average time, .65 year.
- Zoölogy, 5 schools: first year, 3; second year, 2; average time, .73 year.
- Physiology, 3 schools: first year, 1; second year, 2; average time, .51 year.
- Physical Geography, 1 school: second year; average time, .5 year.
- Geology, 5 schools: all fourth year; average time, .66 year.
- Biology, 2 schools: first year, 1; second year, 1; average time, .65 year.
- Psychology, 3 schools: fourth year; average time, .44 year.
- Mineralogy, 1 school: third year; average time, .5 year.

English, 9 schools; total average time, 2.51 years.
- Not specific in printed course, 3 schools.
- Grammar, 3 schools: first year.
- Rhetoric, 6 schools: first year, 4; second year, 1; fourth year, 1.
- English Composition, 4 schools: first year, 2; second year, 1; fourth year, 1.
- History English Literature, 3 schools: fourth year.
- Various classics, 6 schools.

History and Political Science, 9 schools; total average time, 2.05 years.
- Ancient History, 8 schools: first year, 3; second year, 3; third year, 2; total average time, .63 year.
- Mediæval and Modern History, 3 schools: second year, 2; fourth year, 1; total average time, .78 year.
- English History, 6 schools: first year, 3; second year, 1; third year, 1; fourth year, 1; average time, .45 year.
- General History, 3 schools: first year, 1; third year, 2; average time, .93 year.
- United States History, 3 schools: first year, 2; fourth year, 1; average time, .44 year.
- Political Economy, 5 schools: third year, 2; fourth year, 3; average time, .55 year.

Languages:
- Latin—all 8 have 4 years; Roxbury has 6 (2 below).
- Greek, 7 schools; average time, 2.78 years.
- French, 8 schools; average time, 3.14 years.
- German, 9 schools; average time, 3.55 years.
- Spanish, 2 schools; average time, 4 years.

Miscellaneous:
- Bookkeeping, 6 schools.
- Music, 6 schools.
- Drawing (usually mechanical), 8 schools.
- Commercial Law, 3 schools.
- Phonography, 2 schools.
- Commercial Geography, 2 schools.
- And a few other subjects, 1 school each.

(*c*) QUOTATIONS FROM ANNOUNCEMENTS, COURSES, ETC.

"While the studies pursued do prepare pupils to enter college, yet the High School is not a mere college preparatory school, for all the essential features of a practical education are fully provided. As far as possible the system is elective, so that a pupil will not be obliged to devote his time to studies for which he has no aptitude or taste."—*Grand Rapids, Mich., High School.*

"No one is allowed to take all the studies offered, but each is required to make, subject to the approval of the Faculty, such a combination of studies as best suits his needs. No one is allowed to begin Latin and Greek the same year. A minimum of sixteen hours a week each year constitutes a satisfactory course. The regular studies of the first year are Latin, six hours; Mathematics, five hours; English, three hours; and History of the United States and England, two hours. These studies are required of all. In general, four years of Latin, Mathematics, and English, three of Greek, two of History, and one of Physics and French or German, satisfy the ordinary requirements for admission to college."—*Phillips Exeter Academy.*

"Notice to Parents.—The school session begins at 8:30 A. M. and closes at 1 P. M. It is divided into six 45-minute periods, known as the recitation hours. Only two of these can be used by a student in preparing his lessons at school; and to complete the work of the High School creditably in four years requires consistent, careful, and conscientious effort upon the part of the student. Therefore, his time for study should not be encroached upon by social amusements or business occupation."—*Kansas City High School.*

In twenty-two years Kansas City High School graduated 860 pupils, of whom 28 per cent were boys and 72 per cent girls.

"The general course will consist of three studies, full time, five recitations a week, for four years, besides Drawing and Vocal Music; of which studies, one Foreign Language, Algebra, Plane Geometry, two Sciences, and two full years of English will be required."—*Courses of Study for Chicago High Schools.*

"English comprehends Declamation, Composition, and the reading and study of authors. Selections from standard authors are studied critically with the teacher. Supplementary to this, works of standard authors are prescribed for pupils to read by themselves. From these works subjects, from time to time, are drawn, upon which pupils are required to write compositions, the writing going on under the eye of the teacher."—*English High School, Boston.*

Prof. Chas. B. Scott, of the Conference on Natural History, chosen by the Committee of Ten, writes:

"I have very decided ideas in regard to Question 18. My own experience leads me to believe that High School pupils need very much the habits and the powers which come from genuine individual laboratory work in science, and that the sooner such careful study, by the laboratory method, of some one science is taken up in the school the better it is for the pupils. The 'easy generalizations' confirm wrong habits of study or absorption and give the pupils very little power. By all means take up as early as possible some one subject and study it thoroughly."

Mr. Wm. C. Collar, Head Master of Roxbury Latin School, and a member of one of the Committee of Ten Conferences, writes:

"I have always wished, and do not cease to, that other schools would do what I do—put the number of hours against each study and give a statement of what is actually accomplished."

5. SUMMARY AND GENERAL CONSIDERATIONS.

(*a*) COMPARISON OF SPECIAL POINTS IN THE REPORTS FROM THE THREE GROUPS OF SCHOOLS.

(1) Teachers:	Cal. H. S.	Cal. Priv. S.	East. Group.
College graduates	63%	83%	57%
Normal School graduates	21%	8%	19%
Graduates of both	7%	5%	6%
Graduates of neither	23%	15%	29%
Graduates of either	77%	85%	71%
Three or more years' secondary experience	74%	83%	80%
Less than three years' secondary experience	26%	17%	20%
Having Primary and Grammar experience	74%	78%	39%

(2) Pupils:	Cal. H. S.	Cal. Priv. S.	East. Group.
Average to each teacher	28+	8	29—
Of total attendance	Boys, 41% Girls, 59%	All Boys.	Boys, 37% Girls, 63%
Of the graduates	Boys, 39% Girls, 61%	-------	Boys, 33% Girls, 67%
Of those going higher, there are	Boys, 56% Girls, 44%	Boys' Schools.	Boys, 62% Girls, 38%
Of boys graduating, there go higher	40%	----	35%
Of girls graduating, there go higher	20%	----	12%
Of pupils graduating, there go higher	28%	67%	22%
Of boys in attendance, there graduate	44%	----	52%
Of girls in attendance, there graduate	44%	----	56%
Of pupils in attendance, there graduate	44%	74%	54%
Of boys in attendance, there go higher after graduating	18%	----	18%
Of girls in attendance, there go higher after graduating	9%	----	7%
Of pupils in attendance, there go higher after graduating	12%	50%	12%
(3) Average length of school year	9.8 mos.	9.8 mos.	9.7 mos.
(4) Average length of recitation period	41 min.	40 min.	49 min.
(5) Average length of preparatory course	8.4 yrs.	-------	8.2 yrs.

(6) As previously noted in the Eastern schools, options are rather in courses than in subjects. This is true, to a great extent, in California also, with the exception of those High Schools which make everything optional conditioned with the approval of the Principal, or with a reservation in favor of English or Mathematics. A small group of these schools have a somewhat distinctive character. In the English High School, Boston, the number of electives is gradually increased from year to year, until the work of the last is almost all elective.

	Cal. H. S.	Cal. Priv. S.	East. Group.
(7) Fraction of time allotted to Physics devoted to laboratory work	49%	50%	54%
Fraction of time allotted to Chemistry devoted to laboratory work	53%	60%	61%

(8) In all the reports East and West, Botany has the largest number of votes as having a place on the programme of secondary schools. Granting Physics and Chemistry, then, as already very generally conceded subjects, a third science would seem to be Botany. Political Economy, of another group of subjects, received a large number of votes. The High Schools of California seem to be disposed to leave out Advanced Algebra altogether.

(9) The vote on Question 17 seems to indicate very little preference between Elementary Algebra and Concrete Geometry as a beginning study in secondary Mathematics. The general opinion appears to be that both subjects properly belong in the Grammar School.

(10) In answer to Question 18, the vote East and West, with the exception of the California private schools, is in favor of early specialization with later generalization. It may be noticed, however, that those who seem best to understand the force of the question vote in favor of easy generalization in the elementary school, with later specialization.

(*b*) COURSES OF STUDY.

The principal points of difference noted between the East and West as to what is pursued, is in our favor with reference to the study of English classics with us, rather than biography of authors and formal rhetoric, with less average time on classics as shown by the Eastern courses.

The points of difference are against us on Latin, Greek, Solid Geometry, and Plane Trigonometry. As to the length of time devoted to the various subjects:

	Cal. H. S.	Cal. Priv. S.	East. Group.
English	3.30 yrs.	3.50 yrs.	2.51 yrs.
Mathematics	3.21 yrs.	3.53 yrs.	3.34 yrs.
Algebra	1.42 yrs.	1.66 yrs.	1.16 yrs.
Plane Geometry	1.19 yrs.	1.16 yrs.	1.03 yrs.
Solid Geometry	.50 yr.	.50 yr.	.38 yr.
Plane Trigonometry	.52 yr.	.50 yr.	.40 yr.
Science	3.20 yrs.	2.76 yrs.	3.88 yrs.
Physics	1.09 yrs.	1.00 yr.	.85 yr.
Botany	.68 yr.	.83 yr.	.65 yr.
Chemistry	.85 yr.	1.00 yr.	.85 yr.
History and Political Science	2.64 yrs.	2.76 yrs.	2.05 yrs.
Latin	3.19 yrs.	3.60 yrs.	4 (Rox.6)
Greek	2.11 yrs.	2.42 yrs.	2.78 yrs.
French	2.42 yrs.	2.12 yrs.	3.14 yrs.
German	2.33 yrs.	2.00 yrs.	3.55 yrs.

In the East a larger proportion of schools have Advanced Algebra, but the average time for the ordinary presentation of the subject of Algebra is less than with us; this would indicate either that we do more thorough work or that we devote too much time to this study.

Building up a course of study out of the time allotments given above, we have:

Eastern Group.		California High Schools.
2.51 yrs.	English	3.30 yrs.
3.34 yrs.	Mathematics	3.21 yrs.
2.05 yrs.	History and Political Science	2.64 yrs.
3.88 yrs.	Science	3.20 yrs.
11.78 yrs.	Total	12.35 yrs.

These figures make a somewhat stronger showing for the California High Schools in the ordinary English course. However, if we add four years of Latin to the Eastern total, and 3.19 to that for California, we have 15.78 for the Eastern group and 15.54 for our schools. If we leave out Science and put in Greek, the totals become 14.68 for the East and 14.45 for California.

(*c*) The committee has felt that it would rather not make any recommendations, and therefore has confined its labors to the arrangement of the material in shape to be discussed by the Conference. However, the following arrangement and distribution of time is offered merely as a bare outline as a basis for discussion:

Languages—English and others	6 yrs.
Mathematics	3 yrs.
History and Political Science	3 yrs.
Natural Science	4 yrs.
Total	16 yrs.

The year adopted as the unit consists of five recitations per week for one year. The subjects to be taken four at a time for four years. The committee has not been disposed to criticise, but it feels that a word ought to be said with reference to one point: Many of the smaller and weaker schools are starting out with three courses of study, sometimes embracing Greek, when they would do better to confine their energies to a single course and make the work in it as thorough as possible.

W. F. HALL,
T. L. HEATON,
FREDERICK SLATE,
Committee.

REPORT OF THE DIRECTOR OF THE LICK OBSERVATORY.

Lick Observatory, University of California,
September 1, 1894.

To the President of the University of California:

Dear Sir: I have the honor to submit to you my seventh annual report as Director of the Lick Observatory.

The Regents have established a special set of regulations for the government of the Lick Observatory, to which I beg to call your attention. These are printed in the report of the Secretary of the University for 1888, page 26. Every important official action is recorded in our letter-books, or in a regularly kept journal.

The Senior classes in astronomy in various California colleges have been specially invited to visit the Observatory on special evenings set apart for them. Similar privileges have been granted to various conventions meeting in San Francisco and San José. Lectures have been given by the Astronomers in various places.

The Astronomical Society of the Pacific (which now numbers about five hundred members) holds its summer meetings at Mount Hamilton. The Director has replied to hundreds of letters of inquiry on astronomical subjects addressed to the Observatory, and has furnished telegrams, etc., on subjects of general interest, to the press.

The time-service is maintained as before, and the noon-signal from the Observatory reaches nearly every railway station between San Francisco and Ogden, San Francisco and Portland, and San Francisco and El Paso. In these and other ways the Lick Observatory is made directly useful to the public; and it cannot fail to have an important part in the intellectual advancement of the State and of the whole country.

In a few months the Lick Observatory will be able to offer quarters to intending students, and it is likely that the list of students will be materially larger during the next year.

Nearly all of the buildings of the Lick Observatory are in excellent condition inside and out. All the work upon them during the past year has been done by our own workmen, except some repairs to the rolling gear of the large dome.

The honorary degree of Doctor of Science has been bestowed on Professor Barnard by the University of Nashville. He had previously received (on my nomination) the honorary degree of M.A. from the University of the Pacific. Dr. Barnard was awarded the Lalande medal of the Paris Academy of Sciences in December, 1892, and in November, 1893, the Arago medal of the same Academy for his discovery of a fifth satellite to Jupiter.

The honorary degree of M.S. was conferred upon Professor Schaeberle in June, 1893, by the University of Michigan.

On Commencement Day of 1893 the University of California conferred the honorary degree of Doctor of Science upon Professor L. Weinek, Ph.D., Director of the Observatory of Prague, and upon Professor J. E. Keeler, B.A., Director of the Allegheny Observatory. Some of the work of these gentlemen is printed in Volume III of the Publications of the Lick Observatory.

It is quite impossible to give an adequate account of the astronomical work of so active an establishment as the Lick Observatory without taking more space than is available in a report like the present one. I beg, therefore, to refer you to the list of publications* made by the astronomers during the period September 1, 1893, to September 1, 1894, which is annexed hereto, calling your special attention to Professor Schaeberle's discussion of the observations of the solar eclipse of 1893, and to his discovery of a comet on the eclipse negatives; to Professor Barnard's remarkable photographs of the comet *c*, 1893, and of Gale's comet, and to his long series of observations of the fifth satellite of Jupiter (which are now being calculated for a determination of the orbit by Professor Pritchett); to the spectroscopic observations of Professor Campbell, especially those on the spectra of Mars, of the bright-line stars, of the nebulæ, and to his discovery of a star with a measurable diameter; to Mr. Tucker's long series of meridian circle observations; to the important series of sun-spot photographs taken by Mr. Perrine, and to the observations of the August meteors of 1894 by Messrs. Schaeberle, Colton, and Perrine at Mount Diablo and at Mount Hamilton, respectively. Over seven hundred meteors were timed and mapped by the Mount Hamilton observers. Volume III of the Publications of the Lick Observatory contains the work on the moon negatives taken here by myself, and enlarged by Professor Weinek.

A full report of the solar eclipse of April, 1893, will soon be sent to the printer. Professor Schaeberle has been engaged upon this discussion since his return from the expedition in July, 1893. The photographs secured by him are by far the best yet taken.

It is hoped that arrangements can be made to send Professor Campbell to Japan to observe the solar eclipse of August, 1896, spectroscopically. He will need one assistant to aid in the photographic work.

The meridian circle has been employed by Mr. Tucker during the past year, mainly in the observation of a list of one hundred and twenty-five stars selected by Professor Holden from the *American Ephemeris*, *Connaissance de Temps*, and *Nautical Almanac*. These are stars not included in the Berlin *Jahrbuch*, and are to be reduced with stars from the last named work as standard. Four observations have been made of each star in one position of the instrument, and will be repeated in the reversed position. Six hundred observations have been made of the stars of the Berlin *Jahrbuch*, selected by Professor Auwers, in the belt from —10° to +15° declination, to serve as fundamentals, and four hundred and fifty observations of the circumpolar stars of the same work. The places of various short lists of comparison stars have been determined; and with the observations made for special investigations, and for clock corrections, on a few nights other than those used for regular observing, two thousand three hundred observations have been made during the year.

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*The full list of publications, in all departments of the University, is reserved for a succeeding report.

Professor Schaeberle observed a large number of stars at Ann Arbor before 1888, but no reductions had been made when he came to the Lick Observatory. It was agreed that this work should be reduced and printed here, as the star-places would be valuable. Mr. Leuschner in 1888 and 1889 spent an hour a day for about a year in transcribing the observations from the original note-books on to the reduction sheets. Professor Campbell also assisted in this work. The sheets were then sent to three computers in the East, and the work was proceeded with until $860 had been paid for it. This sum was derived from two gifts to the Lick Observatory: (1) from Miss Bruce of New York, $500 (received in October, 1890); (2) from the U. S. Coast and Geodetic Survey, $360 (received in October, 1891, and in February, 1892). A great part of the more mechanical work was done in this way. When the sheets were returned to the Lick Observatory the work was continued by Mr. Tucker under the direction of Professor Schaeberle. The Observatory is under engagement to complete and publish this work, and this should be done promptly. It will fill one of the quarto volumes of our Publications.

Astronomers have refraction-tables which represent observations at the level of the sea. Among the best of these are the tables made at Pulkowa. If similar tables are made at the Lick Observatory, at an altitude of 4,200 feet, the needs of astronomers, in this direction, will be provided for. It is obviously a duty of the Lick Observatory to provide such tables. Accordingly, I agreed with Professor Schaeberle in 1889 on a programme of observations, and he has secured the number required. They are, however, mostly unreduced. One of the first Publications of the Lick Observatory should be devoted to this work.

I brought to California in 1886 the manuscript of a catalogue of 38,000 stars from the Washington zones, on which I had then completed 80 or 85 per cent of the work. I have not been able to do anything further with it since that time. The services of a computer for six or eight months are required to complete it. It will fill two of the quarto volumes of the Observatory Publications.

By direction of the Regents I have prepared a short and popular account of the Lick Observatory for free distribution. The pamphlet contains thirty-two pages, and is stereotyped. The first edition (printed in August, 1894) consists of one thousand copies.

The very liberal policy of the Lick Observatory with respect to visitors has made us many friends in all parts of the world. About 40,000 persons have visited the Observatory since June 1, 1888. I have noticed, with great pleasure, that it is very generally understood that the Lick Observatory stands ready to answer any and all questions relating to astronomy, so far as it is able, and our correspondence of this sort is large, and is increasing. It sometimes requires more time than can readily be spared, but I am satisfied that such time is well spent. When any unusual event occurs, like the appearance of the brilliant meteor of July 27, 1894, we receive unsolicited reports from a large number of intelligent correspondents throughout the State, which are very valuable to us, and which show, at the same time, a useful relation between the Observatory and the public. The Astronomical Society of the Pacific, through its meetings and through its publications, is an important factor in such relations. The officers of the Observatory have regularly transmitted to the newspapers popular accounts of interesting results attained here. Each of these reports, short or long, expresses the facts in each case precisely as they are; and I think we may say that these reports, which are obviously sober-minded and entirely reliable, have done much to establish the relation of trust and respect between the Observatory and the public, which we feel is a source of strength, and which aids us in our work.

With the aid of an appropriation from the Santa Clara County Board of World's Fair Commissioners an exhibit of transparencies and photographic prints was prepared for exhibition at Chicago in the Santa Clara County space of the California Building. At the Midwinter Fair this exhibit was displayed in the Santa Clara County Building. The Regents of the University directed that the Observatory prepare a second exhibit, to be displayed at the Midwinter Fair in the space allotted to the University of California. This second exhibit is somewhat fuller than the exhibit at Chicago, as many new negatives have been obtained since June, 1892, when the first exhibit was completed. The chief features of both these exhibits are framed glass transparencies of astronomical and other negatives made by the astronomers of the Observatory, and also enlargements from these negatives made either at Mount Hamilton, or by foreign astronomers and experts. Each picture bears a label which gives the necessary information regarding it. Copies of many of these negatives can be purchased from the leading photographers of San Francisco and San José. Attention is particularly directed to photographs of the solar coronas of January, 1889, December, 1889, and April, 1893, by Messrs. Burnham, Schaeberle, and Barnard; to photographs of the moon, in the focus of the large telescope, taken by various astronomers; to the very successful enlargements of these negatives made by Baron Rothschild, of Vienna, Professor Weinek, Director of the Observatory of Prague, Victor Nielson, of Copenhagen, and by Mr. Colton of the Lick Observatory (these enlargements are of various scales, from the moon's diameter equal ten feet, downward); to photographs of the milky way and comets, by Professor Barnard; to star maps in both the northern and southern hemispheres; to photographs of nebulæ, and especially to pictures of the total solar eclipse of April, 1893, by Professor Schaeberle; to photographs of drawings of Mars and of comets, by Professor Hussey; to spectrum photographs and drawings, by Professor Campbell; to photographs (enlarged) of Jupiter, taken with the large telescope; to photographs of the sun and sun-spots, taken by Mr. Perrine, and to views of the Lick Observatory, its instruments and its surroundings, taken by all the astronomers.

The total money outlay for the improvement of Mr. Lick's tomb has been $755 23. Of this, $445 80 was paid by the Lick Trustees, and $309 43 has been made a charge against the annual budget of the Lick Observatory for the years 1894–5.

Two cottages designed as quarters for Messrs. Barnard and Campbell have been nearly completed during the year.

The attic is the only dangerous part of the main building of the Lick Observatory with respect to fire. There are now two hydrants in it, each provided with hose. At some future time the advice of a competent architect should be taken on plans to make this more safe from fire, and it will be worth while, I think, to expend considerable money in making the necessary changes. We cannot afford to run any risks in this respect.

The large dome has worked well in every respect, except that the wheels of the live-ring have on three occasions worked loose and left the tracks. The Lick Observatory Committee authorized the purchase of an inside guard-rail, which was put on in August, 1894. I believe the dome is now entirely safe. It is carefully inspected once a week.

At some future time I wish to bring to your attention the desirability of constructing a gallery around the outside of the large dome some twenty feet above the ground. The cost will not be great; it was a part of the original plan; it will materially improve the looks of the building; and it will be very useful to the observers.

At the present time the storage-capacity of the reservoirs is as follows: (1) Huyghens reservoir: 65,000 gallons; 31 feet below the observatory level; it is used to hold the rain water which comes from the roofs of the Lick Observatory, and of the brick house. A windmill here lifts the water to Copernicus 205.4 feet higher. (2) There is a small catchment (safety) reservoir of 1,000 gallons under the east porch of the Lick Observatory. (3) Copernicus reservoir: capacity of the brick reservoir, 35,000 gallons; of four wooden tanks on the same level, 16,000 gallons; total, 51,000 gallons; 174.4 feet above the Observatory; supplied by the windmill pump at Huyghens; the water of Copernicus reservoir supplies the power to the water-engines and rams of the great dome. The water in Huyghens and Copernicus reservoirs is not fit for household uses, as it is covered with oil from the machinery in the dome. (4) Aquarius reservoir (at the springs): capacity of the main reservoir, about 27,000 gallons; of the smaller adjacent reservoir, about 9,000 gallons; of five small wooden tanks, 10,000 gallons; of three larger wooden tanks, 10,000 gallons; total storage capacity, 56,000 gallons; this reservoir is 365.5 feet below the level of the Observatory, and 411.5 feet below the level of Kepler reservoir, which it supplies by means of a steam pump (and by means of a Pelton wheel in the winter time when there is a great deal of overflow-water). (5) Kepler reservoir: two brick reservoirs of 85,000 gallons capacity each.

The water supply from the springs varies greatly between summer and winter, between wet and dry seasons. In the rainy winter of 1889–90 the daily supply was about 22,000 gallons, or over 600,000 gallons per month. The smallest daily supply, towards the end of the dry season, is from 400 to 500 gallons (the daily expenditure of water by the Lick Observatory and dwelling-houses has been about 1,500 gallons). During the months of May or June to November we must depend largely on stored spring water for use. During the months of November to May there is a great waste of water at the springs. We are obliged to let it overflow, for there is no suitable place to construct a reservoir near the springs, and it is not even safe to place more wooden tanks near them, on account of the shifting nature of the soil. It is possible that a small reservoir of some 20,000 gallons can be constructed a short distance up the road (near a little spring which is now utilized as a part of our supply), and a trial of this will be made as soon as practicable. If necessary, another reservoir can be built at Kepler, but the ground (loose soil) is not favorable. It is probable, therefore, that the supply of spring water for the Lick Observatory must be limited by the capacity of the present reservoirs, say 170,000 gallons at Kepler and about 56,000 gallons at Aquarius. It then becomes very important to economize the use of this water, and there are several ways in which this can be done.

The mean annual rainfall at the Lick Observatory is 32.99 inches; 20 inches is probably an absolute minimum. At present 18,576 square feet of roof surface is arranged to catch the rainfall and to lead it to reservoirs. The average rain supply is then 388,000 gallons (and the minimum, 232,000 gallons). By including more roof surface the average supply can easily be brought up to 400,000 gallons. We can store of this supply only 116,000 gallons at present (Huyghens, 65,000; Copernicus, 51,000), and we therefore waste annually at least 284,000 gallons, for lack of storage. It therefore seems to be of the first importance to construct somewhere south of the large dome (and on a level some 30 feet lower) as large a storage reservoir for rain water as possible. A large part of the bricks for such a reservoir are now on hand, and it could be constructed mainly by the labor of the Observatory workmen. This water could be kept clean and entirely fit for domestic uses at the new brick cottages and at the old wooden cottages and the stables. The cottages would then use spring water (from Kepler) for drinking and cooking, etc., only, and would prefer the clear rain water for other uses. Whatever rain water was so used would be saved in the expenditure from Kepler. The new rain water reservoir would then, in effect, be the same as increased storage capacity of spring water at Kepler. It would also serve as an admirable and efficient fire protection to all the cottages. I beg to recommend this suggestion most strongly to your attention.

We have lately fitted some of the offices and rooms of the Observatory with steam coils, formerly used in the South Hall at Berkeley, connecting them with the steam engine employed to drive the dynamo. In this way it is possible to heat these offices and rooms without being subjected to the intolerable smoke which has been endured, more or less patiently, for six years. (See Publ. A. S. P., Vol. II, page 63.) The cost to the Observatory has been *nil*. The coils had been rejected at Berkeley, and the Lick Observatory workmen have done all the steam-fitting. It is hoped that this system may be still further extended.

The electric light and storage battery plant, which was the gift of the Edison Company, was put in order and started in October last, by Mr. Babcock from the San Francisco office. The battery has been constantly in use since that time, displacing the old chromate batteries which furnished a comparison spark for the spectroscope, and to illuminate the *mire* of the meridian circle. The capacity of the battery is small (the full charge would only light ten 16-candle lamps for four hours), so that it is seldom used for general lighting, but is a great convenience for the two uses named, and in time may be used to displace some of the other batteries for general work. The Observatory and offices are equipped with circuits and lamps, and a larger storage capacity would permit the use of more of this safe light. Windmills appear to be successfully used for driving dynamos. As strong winds prevail here, this would be an excellent source of power, and could probably be made to furnish light for all uses.

I earnestly urge upon your attention the planting of trees on the "reservation." We now know what trees will thrive here, thanks to experiments by the Agricultural Department of the University and by ourselves. If the Lick Trustees had proceeded in this respect, we should already have a situation much better suited for astronomical observation, and far more sightly to the eye. If a Forestry Station were to be established here its expenses would be small, and its results would be valuable to the State at large, and particularly so to the Observatory. To establish such a station requires a simple authorization from the Regents. I understand that Dr. Hilgard is in favor of this extension of his work.

The following important gifts have been received by the Lick Observatory:

From the Smithsonian Institution, through the Secretary, Dr. S. P. Langley, $50, for fitting a special quick shutter to the large telescope, to be used in making enlarged photographs of portions of the sun's surface. The shutter was loaned to the Observatory by Dr. Langley.

The third installment of $1,000 was received from Mrs. Hearst for the first half of the year 1893. (Received January 3, 1894.)

Mr. Walter W. Law gave an additional sum, $270, to complete the illustrations of the Moon for Volume III of the Publications of the Lick Observatory.

The Royal Society of London generously presented the Observatory with its *Philosophical Transactions* for the years 1872–1886 (making our set complete), and with its *Proceedings*, Volumes 33–44. Many other gifts of books are acknowledged in the report of the Secretary of the University, but the gift of the Royal Society deserves a special acknowledgment.

Gifts of books, etc., to our library are regularly acknowledged in the reports of the Secretary of the University. They are very numerous and valuable. We receive the publications of all the principal observatories in the world and of a great number of academies of science (including those of Paris, London, Berlin, Dublin, Vienna, Munich, Rome, etc.), as well as generous gifts of special memoirs from scientific men all over the world. In return for such gifts the publications of the Observatory are distributed as far as the editions are sufficient. A list of all books and photographs sent out is kept at the Lick Observatory.

The total money gifts to the Lick Observatory since 1888 have been nearly $10,000.

The forest fires of 1891 have been spoken of in the Publications A. S. P., Vol. III, page 292, and Vol. V, page 109. These fires burned around a semi-circle from north (through east) to south; they were never nearer than 4,000 feet to the Observatory; and they were confined by our work and otherwise to the farther slopes of the mountains round about.

Some time on July 28 or 29, 1894, a fire started in a deep cañon to the west of the Observatory and to the north of the brick-yard. Its smoke was very obvious all day Sunday, July 29th. On Monday the Observatory workmen, with one volunteer, cut a narrow trail from a point above the fire down to the trout stream in the bottom of Cañon Negro, which lies north and northeast of the Observatory peak. This trail was between the forest fire and the Observatory, and beyond the the trail back fires were set to widen the line of protection. On Tuesday morning Mr. Macdonald, machinist of the Lick Observatory, went twice over this line from its beginning to the trout stream (some 1,500 feet below the summit), and found no place in which the forest fire had crossed our back fires. At noon on Tuesday, however, the fire had crossed the line, and was making great progress towards the Observatory, and especially towards the wooden cottages near the Observatory and the wooden stables and sheds. Fortunately, a considerable space below these buildings along the road to the springs (Aquarius) had been cleared of trees and brush in 1891. This space was once more quickly cleared off, and a line of back fires set along the Aquarius road. More men were sent for, and during Tuesday and Wednesday (day and night) there were some forty persons employed in fighting the fire (including all the astronomers of the Lick Observatory). About two miles of back fires were set and controlled. No damage whatever was done to any of the wooden cottages, to the stables, to the house of the United States Coast and Geodetic Survey, to the water tanks, to the engine and pump houses at the springs. These were protected by our labor. The buildings of the Lick Observatory were certainly at no time in danger. It is probable that we rather underestimate than overestimate the risk from such fires as these. Unless the winds are very high* (say, 30 miles per hour and upwards), it seems easy to control a forest fire of which one has sufficient warning. With high winds carrying large sparks, it is almost impossible to defend long lines or large areas. In such cases the wise course is to defend buildings and their immediate surroundings, and let the rest go. At the worst, we only lose a few hundred acres of chaparral, which renews itself within a few years. In one respect the present fire was vastly easier to manage than those of 1891. It was so near to the buildings that the water supply of the Lick Observatory could be and was utilized. After using all that was necessary, there remained in Copernicus reservoir 15,000 gallons; in Kepler reservoir, 122,000 gallons; in Huyghens reservoir, about 50,000 gallons, and a good supply at the springs. We become so used to the changed conditions of life at Mount Hamilton, that it does not strike us as strange to see members of the University faculty in the role of firemen, not to say salamanders. To realize the incongruity, it is necessary to shift the scene, and to imagine the fire to be in Greenwich Park, or at Enckeplatz, S. W., Berlin. Efficiency is a virtue, wherever it is found, and the astronomers of the Lick Observatory may justly claim to be efficient in the theory and practice of fighting forest fires.

There are many other topics of which it would be perfectly appropriate to speak in a report like the present, but which I have omitted in order to keep within reasonable limits of space.

The "Notices from the Lick Observatory," regularly printed in the Publications A. S. P., give the history of the institution in a permanent form and allow its progress to be traced from month to month.

I trust I may be allowed, as in some manner the spokesman for my colleagues, to express our sense of the generous support which the Observatory has received from the Regents during its whole history. I feel sure that I have a right to say, also, that no work has been spared on our part to make the best use of the opportunities which have been afforded us.

Respectfully submitted.

EDWARD S. HOLDEN,
Director of the Lick Observatory.

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*The highest velocity of the wind Tuesday was 15 miles per hour, at 11 P. M.; the highest of Wednesday was 20 miles, from 3 to 8 A. M. and from 5 P. M. to 12 P. M.

REPORT OF THE SAN FRANCISCO ART ASSOCIATION.

(MARK HOPKINS INSTITUTE OF ART.)

To President MARTIN KELLOGG, *University of California:*

DEAR SIR: The Art Association was formally placed in possession of the Institute on the third day of March, 1893, and the School of Design opened its first session in the building on the first day of May, 1893, with fifty-four (54) students, which number increased to ninety-six (96) at the close of the school year, May 15, 1894, this being the full number the rooms occupied by the school could accommodate. In fact, a number of applicants could not be taken for want of sufficient room.

The Board of Directors brought this fact to the attention of Mr. Edward F. Searles, through his legal representatives, and Mr. Searles, with his unlimited generosity, signified his willingness to remodel the stable building into suitable quarters for school purposes. This work has been accomplished, and the students now occupy the new building. Our facilities are now so largely increased that, at least, two hundred students can be accommodated, and new classes in wood-carving, illustration, architecture, etc., will be added in the near future. A class in modeling has already been established.

On the evening of May 25, 1894, the annual exhibition of works of the students was held, and the regular prizes distributed, Miss Pauline Schoenmaker being awarded the "Avery medal" for general excellence in oil painting; Mr. G. Piazzoni, the "Alvord medal" for best drawing from the antique, and Mr. J. M. Raphael, the "W. E. Brown medal" for best drawing from life. The studies exhibited showed a steady improvement in the quality of the work of the students over that of previous years.

Students are registered from British Columbia, many of the Pacific Coast States, and from all parts of California.

Many graduates of the school are now finishing their art education in Paris and Munich, and they have taken as high positions in the fine-art schools abroad as students from any of the art schools in the United States.

With our new school building, with its perfect system of lighting and special arrangements for art-school purposes, our facilities for art instruction equal, if they do not surpass, those of any school of its character in America, and should enable the school to take even a higher position than heretofore.

Respectfully,

J. R. MARTIN,
Assistant Secretary.

REPORT OF DEAN OF HASTINGS COLLEGE OF THE LAW.

San Francisco, October 23, 1894.

To Dr. Martin Kellogg, *President of the University:*

Dear Sir: The Hastings College of the Law, constituting the Law Department of the University, is in a fairly flourishing condition. The number of students has increased from 140 in the year 1893–94, to 156 in the year 1894–95. Larger and more suitable lecture-rooms will, in all probability, soon be necessary. The present rooms were never designed for lecture purposes, and besides they are becoming too small to comfortably accommodate the increasing attendance. It is to be hoped that the State can see its way clear in the near future, to give this department and the other departments of the University in San Francisco, relief in the way of a University building. The growth of the college, and modern methods of instruction in the law, have rendered the employment of an additional instructor almost imperative at this time. Our present needs are, therefore, new quarters and an increased teaching force.

Very respectfully,

CHARLES W. SLACK,
Dean Hastings College of the Law.

REPORT OF THE DEAN OF THE MEDICAL DEPARTMENT

San Francisco, October 8, 1894.

To the President of the University:

Dear Sir: I have the honor of making the following report of the progress and needs of the Medical Department of the University.

In order to conform to the custom of the academic departments of the University and of Eastern medical colleges, the Faculty has determined to change the plan, heretofore pursued, of conducting a spring and summer session. The session of 1895 will begin January 7th and continue six months. Thereafter the sessions will begin September 1st and continue eight calendar months.

Recognizing the necessity of adequate preliminary training, the Faculty now requires of all matriculants the presentation of credentials equivalent to a diploma from an accredited High School or the passing of an examination embracing subjects of a High School course.

During the past year the course of instruction has been extended to four years. Four full years of medical study are required of all candidates for the degree of Doctor of Medicine, except graduates of accredited literary or scientific colleges and those who have spent two years in attendance upon the Natural Science course of the University, or some other recognized institution.

Notwithstanding the greatly increased requirements, both for matriculation and graduation, there has been a gratifying increase in the number of students in attendance, the total enrollment during the past session being 135.

The Faculty labors under one serious disadvantage. The building now occupied, the gift of the late Dr. H. H. Toland, has become unfit for the teaching of modern medicine. Repairs are so frequently required that the funds are largely used for this purpose alone, preventing the Faculty from making improvements that are sadly needed. Besides this, since the college was founded, the growth of the city has been such that the building is far removed from the business and residence centers. The students bitterly complain of the loss of time necessitated by the great distance separating the college from the City and County Hospital, where their clinical work is done.

From the sale of a portion of the land originally deeded to the University by Dr. Toland, a lot has been purchased directly opposite the City and County Hospital. For many years the Faculty has sought to obtain an appropriation from the State Legislature for the purpose of erecting a suitable building upon this lot. At the last session of the Legislature the hopes of the Faculty were raised by the almost unanimous passage of a bill appropriating $250,000 for a building for all the affiliated departments of the University. It was felt that from the establishment of such an institution the University could enter upon a new and broader path of prosperity. Its influence upon the *esprit de* *corps* of the Faculties of the various affiliated colleges, upon the University as a whole, and upon the public at large, could not be overestimated. Unfortunately, such large appropriations had been made for other purposes, that the Governor did not see his way clear to approve the bill.

The Faculty earnestly hopes that the Board of Regents will appreciate its efforts to raise the standard of medical education and will join with the Faculty in an endeavor to obtain the needed appropriation from the State Legislature at its forthcoming session.

Respectfully submitted.

R. A. McLEAN,
Dean.

REPORT OF THE SECRETARY OF THE SAN FRANCISCO POLYCLINIC.

(POST-GRADUATE MEDICAL DEPARTMENT OF THE UNIVERSITY OF CALIFORNIA.)

San Francisco, October 8, 1894.

To the President of the University:

Dear Sir: By articles of affiliation the San Francisco Polyclinic became in May, 1892, the Post-Graduate Medical Department of the University of California. The Polyclinic had, even before that, been giving instruction by practical and demonstrative methods to graduates of colleges of regular medicine; but its students had been few, as the institution, with meager facilities and in unsuitable quarters, was directly competing for patronage with the well-established, well-equipped, and well-managed schools of the East. Since the affiliation the conditions have, up to the past few months, remained unchanged.

In June of this year the institution moved into a building of its own adapted to its special work and built for it by its friends. The building contains seven clinic rooms for the dispensary work, a large lecture room, a bacteriological laboratory, waiting rooms, reading rooms, and a drug store.

The finances of the Polyclinic are in a satisfactory condition. As a teaching institution it is but just beginning its career.

HARRY M. SHERMAN,
Secretary Board of Trustees San Francisco Polyclinic.

REPORT OF THE DEAN OF THE COLLEGE OF DENTISTRY.

San Francisco, November 20, 1894.

To Martin Kellogg, A.M., LL.D., *President of the University of California:*

Dear Sir: I have the honor of making the following report of the Department of Dentistry.

Since our last report, the predictions then made have been quite fulfilled. In order to prepare for an increased attendance, we were obliged to enlarge the premises occupied by the College of Dentistry in the Donohoe building. This involved a lease of the entire sixth floor, and an increase in the seating capacity of the lecture room and the department of manual training in the infirmary. We are now well equipped and enabled to accommodate two hundred students without crowding.

The opening of the thirteenth session bids fair to test our facilities to the utmost, as the enrollment has been beyond anything in the history of the school.

There is a marked improvement in the material presented, which is no doubt due to our advanced standard of entrance requirements.

With the twelfth session we inaugurated the plan of paying monthly salaries to our instructing staff, who are elected annually by the Faculty. The results prove the wisdom of the plan. Not only is the attendance more constant, but the character of service has been improved.

The policy of the Faculty has been to devote almost the entire income to educational purposes, which has resulted in our having, probably, the best equipped dental college in the country, and a department of which the mother university may well be proud.

The work has been arduous for the governing Faculty, who are all actively engaged in private practice, but who still devote many hours each week to the work of the school without reward, other than a grateful professional appreciation.

The income of the department now diverted to payment of rents and Sunday services would, with future surplus over necessary expenditures, enable us to pay fixed salaries to professors in each department if the professional colleges of the University could be housed by the State in some central location. We could thus secure and maintain, for each chair, the best talent that the country afforded, and round out the usefulness of the University of California.

We need a closer relationship with the academic department, which can only be secured by a standard of entrance requirements for the professional schools, established and supervised by those in authority. When this is done our students will be true sons and daughters of the University, and our graduates will be eligible to membership in its Association of Alumni.

Yours respectfully,

L. L. DUNBAR,
Dean.

REPORT OF THE DEAN OF THE COLLEGE OF PHARMACY.

San Francisco, November 1, 1894.

To President Martin Kellogg, *University of California:*

Sir: The work of the College of Pharmacy for the year 1894 is now virtually concluded, and I am able to report to you upon the results, as well as upon its needs in view of the year's experiences.

The total number of students was 110, of whom 71 were in the Junior and 39 in the Senior class. Of the Juniors, only 49 presented themselves at the final examination, and of these, probably one third will fail to obtain sufficient credits to entitle them to enter the Senior class next term.

Among the causes which have contributed to this unsatisfactory result, I may mention the raising of the standard required, and the lack of general education on the part of some students. The Trustees and Faculty have recently taken steps to remedy the latter evil by raising the requirements for entrance at the next term, with the expectation that in a few years they will be able to demand a high school education as a condition of matriculation.

The same causes will doubtless result in the graduating of a smaller percentage than usual of the Senior class. The course of instruction is being extended almost yearly, especially in the line of practical work, our aim being to keep this college in the very front rank among the Colleges of Pharmacy on this continent.

The expenses are met entirely from the fees received for tuition. The cost of maintaining the building (alterations, repairs, taxes, insurance, interest on mortgage), with gas, water, fuel, etc., added to the necessary apparatus, chemicals, specimens, etc., leaves but a very small sum available as compensation to the Faculty, with nothing whatever for enlargement. It has now become necessary for us to have two additional laboratories (one for pharmaceutical chemistry and the other for microscopy and pharmacognosy), to secure which a new building would have to be built. But we have no funds for such a purpose. Had we such a building as we ought to have, our teaching facilities and the standing which our college has attained among the sisterhood of Colleges of Pharmacy would attract to this State many who now seek their pharmaceutical education elsewhere. It is not to the interest of the State that these young people are allowed to go away, when such a small outlay would bring them here. Had the bill which the last Legislature passed, providing for a building in San Francisco to accommodate the Colleges of Law, Medicine, Dentistry, and Pharmacy, become a law, these students would add to the number of those now receiving their instruction here, and we should at the same time be better equipped for imparting the knowledge which is now communicated under some disadvantages.

I am, sir, very respectfully,

W. M. SEARBY,
Dean.

PUBLISHED WRITINGS OF NEW MEMBERS OF THE FACULTY.

THOS. P. BAILEY., Jr., Ph.D., Assistant Professor of the Science and Art of Teaching.

1. The development of character (inaugural thesis, Columbia, S. C., 1891).
2. Review of translation from Herbart. *Pedagogical Seminary*, Feb., 1893.
3. Humanity of the Spiritual Life. *Christian Thought*, Oct., 1892.
4. Ejective Philosophy. *Am. Journal of Psychology*, Aug., 1893.
5. Psychology for Teachers. *Proceedings South Carolina State Teachers' Association*, 1893.
6. Herbart and Education for Character. *Southern Educational Journal*, Dec., 1892, and Jan., 1893.
7. Report on Child-Study. *Proceedings South Carolina State Teachers' Association*, 1894.
8. Discussions of Dr. Stanley Hall's Address on Child-Study. *Proceedings National Educational Association*, 1894.

H. P. JOHNSON, Ph.D., Assistant Professor of Biology (*ad interim*).

1. Amitosis in the Embryonal Envelopes of the Scorpion. *Bull. Mus. Comp. Zoöl. at Harv. Coll.*, vol. XXII, pp. 127–161 (3 plates); 1892.
2. A contribution to the Morphology and Biology of the Stentors. *Jour. of Morphology*, vol. VIII, pp. 467–562 (4 plates); 1893.
3. The Plastogamy of Actinosphærium. *Jour. of Morphology*, vol. IX, pp. 269–276; 1894.

E. B. McGILVARY, Ph.D., Instructor in English.

1. Revision of a translation of the Gospel of Matthew from the original Greek into the Lao. Chiengmai, Siam. 1893.
2. The Acts of the Apostles, translated from the Greek into the Lao. Chiengmai, Siam. 1893.
3. The Gospel of John, translated from the Greek into the Lao. Chiengmai, Siam. 1894.
4. The Gospel of Luke, translated from the Greek into the Lao. Chiengmai, Siam. 1894.
5. A series of articles in *The Independent*, New York, illustrative of some features of Lao manners and customs.

WM. A. MERRILL, Ph.D., Professor of the Latin Language and Literature.

1. How the Germans study Philology. *Education*, Nov., Dec., 1887.
2. Some peculiarities of diction and syntax in Cicero's De Legibus. *Proceedings of Am. Phil. Ass'n*, 1887.
3. The teaching of Vergil. Some defects in preparatory work. *Jour. of Education*, Dec. 22, 1887.
4. Vergil and Latin pronunciation. *Jour. Education*, June, 1888.
5. The changes in the Roman Constitution proposed by Cicero in the De Legibus. *Proc. of Am. Phil. Ass'n*, 1888.
6. Vergil or Cicero; which should precede? *Academy*, June, 1888.
7. Hale on the *Cum* constructions. *Education*, May, 1888.
8. How to teach Cæsar. *Jour. Education*, May, 1888.
9. German programs. *Nation*, Feb., 1889.
10. Macaronic poetry. *Miami Journal*, Feb., 1889.
11. College lectures and examinations. *Nation*, April, 1889
12. Clerical jesting. *Nation*, April, 1889.
13. Aim of college Latin course. *Ohio College Ass'n*, 1889.
14. The etymology of *Janus*. *Nation*, Dec., 1884.
15. Short O and short A. *Nation*, Dec., 1885.
16. Corruption of English. *Nation*, Dec., 1887.
17. The Degree of A.B. *Nation*, Feb., 1887.
18. The practical value of a liberal education. *Education*, March, 1890.
19. Sanctii Minerva and early Spanish philology. *Am. Phil. Ass'n*, 1890.
20. Classification of public documents. *Library Journal*, April, 1891.
21. Signification and use of the word *Natura* in Lucretius. *Proc. of Am. Phil. Ass'n*, 1891.
22. Chase's edition of Horace. *Educational Review*, Sept., 1892.
23. Alliteration in Lucretius. *Proc. of Am. Phil. Ass'n*, 1892.
24. Ashmore's "Terence." *Independent*, April 5, 1894.
25. Preston & Dodge's "Roman Private Life." *Classical Review*, Oct., 1894.
26. Vollmer: De funere publico. *Classical Review*, June, 1894.
27. Froehde: Probus and Pliny. *Classical Review*, June, 1894.
28. Lucretius, Book III. Nearly ready for the "Students' Series." Boston.

FINANCIAL STATEMENT.

NOTE.—The Act of the Legislature of the State of California, entitled "An Act to provide for the permanent support and improvement of the University of California by the levy of a rate of taxation and the creation of a fund therefor," approved February 14, 1887, contains the following provisions:

Section 5. The money derived from said fund must be applied only to the support and permanent improvement of the University, and the Board of Regents must include in its biennial report to the Governor a statement of the manner and for what purposes the money was expended.

The following statement shows in outline the manner and purposes of the expenditures of the State University Fund for the fiscal years 1892–93 and 1893–94. Statements showing these expenditures in detail are given in the Annual Report of the Secretary of the Board of Regents for the years mentioned, copies of which are sent herewith:

RECEIPTS.

	1892–93.	1893–94.
Cash on Controller's warrants	$115,575 06	$118,123 39

DISBURSEMENTS.

	1892–93.	1893–94.
Advertising and printing	$340 15	$205 55
Department of Botany	317 15	442 78
Department of Biology	636 02	822 93
College celebrations	1,082 45	257 70
College of Chemistry	16,334 63	17,466 91
College of Civil Engineering	13,768 08	13,141 84
College of Letters	----------	13,491 67
Equipment	4,706 44	2,045 95
Repairs	3,245 64	2,510 87
Fuel	987 95	1,096 53
Library	3,064 90	6,908 36
Lick Observatory	25,608 15	25,748 60
Department of Mineralogy	224 44	585 90
Department of Military Science	297 43	324 14
Museum	1,091 07	2,913 43
Official lecturing expenses	2,008 82	2,238 20
Physical culture	4,711 74	4,073 43
Department of Physics	1,155 31	715 45
Postage	568 00	458 00
Printing monographs	----------	730 91
Rent of Board room	408 00	----------
Stationery	314 53	272 14
Telegraphing and expressage	541 88	522 91
University Extension	83 35	86 95
University Printing Office	1,964 37	1,942 85
University site improvements	4,702 40	5,864 10
Water supply	2,412 16	2,134 99
Reserved for permanent improvements	25,000 00	11,120 30
Totals	$115,575 06	$118,123 39

UNIVERSITY OF CALIFORNIA.

BIENNIAL REPORT

OF THE

PRESIDENT OF THE UNIVERSITY

ON BEHALF OF THE BOARD OF REGENTS,

TO HIS EXCELLENCY THE GOVERNOR OF THE STATE.

1894-1896.

SACRAMENTO:
A. J. JOHNSTON, : : : : : : SUPERINTENDENT STATE PRINTING.
1896.

With the compliments of PRESIDENT KELLOGG.

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REPORT OF PRESIDENT OF THE UNIVERSITY.

University of California,
Berkeley, Cal., September 1, 1896.

To his Excellency James H. Budd, *Governor of the State of California:*

Sir: On behalf of the Regents of the University of California, I have the honor to submit our biennial report for the years 1894–96.

The following changes have taken place in the Board of Regents since the date of the last report:

Regent George Jennings Ainsworth died on the 20th day of October, 1895, at Portland, Or. Mr. Ainsworth was a graduate of this University, in the first class (1873) which entered after the organization of University instruction. Ten years after graduation he was appointed a Regent. Business necessities kept him much at a distance from San Francisco, but while in near residence he was a faithful attendant on the sessions of the Board. His upright character, business ability, and gentlemanly bearing won him the high esteem of his fellow Regents.

J. B. Reinstein, Esq., of the same University Class of 1873, was appointed to fill the vacancy caused by Regent Ainsworth's death.

The terms of two Regents expired March 1, 1896; viz., Hon. Timothy Guy Phelps and Columbus Bartlett, Esq. Mr. Phelps was reappointed to succeed himself. Regent Reinstein was appointed to succeed Mr. Bartlett. John Eliot Budd, Esq., was appointed to fill out the unexpired term of Regents Ainsworth and Reinstein.

Since the date of the last report, the following changes have taken place in the list of those engaged in the work of instruction at Berkeley:

Professor E. L. Greene resigned his position to accept the Professorship of Botany in the Catholic University at Washington.

Associate Professor Harold Whiting resigned his position in the Department of Physics, at the close of the year 1894–95. With his family he was lost by the shipwreck of the "Colima," in June, 1895, off the coast of Mexico. He was much beloved by his associates in the Faculty, and his untimely death brought grief to the whole community. It was found that he had made a generous bequest to our Department of Physics in the gift of $20,000 for the establishment of an instructorship.

Instructors Franklin Booth, F. G. Burgess, F. E. Haynes, Marshall A. Howe, S. D. Huntington, C. W. Leach, L. J. Richardson, and J. A. Sladky have terminated their connection with the University.

New Instructors still on the list are W. C. Blasdale, B.S., L. F. Chesebrough, Clive Day, A.B., Gustave Faucheux, B.L., J. H. Gray, Jr., B.S., Walter M. Hart, A.M., A. P. Hayne, Ph.B., E. A. Hersam, C. S. H. Howard, A.B., W. L. Jepson, Ph.B., B. R. Maybeck, E. B. McGilvary, A.M., J. C. Merriam, Ph.D., Clifton Price, Ph.D., and E. H. Simonds, B.S.; and, beginning with the new year, K. C. Babcock, Ph.D., in the Department of History, and W. J. V. Osterhout, A.M., in that of Botany.

The following Instructors have been promoted to Assistant Professorships: Wm. D. Armes, M.L., L. T. Hengstler, Ph.D., Myer E. Jaffa, M.S., Exum P. Lewis, Ph.D., H. I. Randall, B.S., W. J. Raymond, B.S., L. DuPont Syle, A.M.

Assistant Professors A. F. Lange, Ph.D., G. M. Richardson, Ph.D., and Edmond O'Neill, Ph.B., have been promoted to be Associate Professors, in English Philology, Classical Archæology, and Organic and Physiological Chemistry, respectively.

Professor William A. Setchell, Ph.D., has succeeded Professor Greene in the chair of Botany. Professor Setchell received the degree of A.B. from Yale, the degrees of A.M. and Ph.D. from Harvard. He was for several years in charge of one department in the Marine Laboratory at Wood's Holl; and at the time of his election to our professorship he was Assistant Professor in the Sheffield Scientific School.

In the year 1872, Edward Tompkins, Esq., one of the earliest Regents and one of the stanchest friends of this University, deeded to the Regents a tract of land for the establishment of the "Agassiz Professorship of Oriental Languages and Literature." The land was to be held until the income of $50,000 could be realized from its sale. Its value was slow to reach the required point, and it was not till the summer of 1895 that the Regents could regard the professorship as established, and proceed to appoint an incumbent. Then their choice fell upon John Fryer, LL.D., an English scholar who had long lived in China, and had been for many years in the Chinese imperial service as a promoter of education among the higher classes of the country. His chief duties were to prepare text-books in science, history, and other studies. He wrote many treatises himself, and translated many others. This work has brought him into close relations with the leading men in the empire, and given him a position of acknowledged eminence. He has received the Third Degree of Brevet Civil Rank. He begins service in our University with the year 1896–97, and is prepared to give instruction in the Chinese language, and to lecture on the language, the literature, the philosophies, the religions, and the history of the Chinese people. His Chinese library is valuable, and contains a copy of the great Chinese Encyclopædia of over 1,600 volumes. The classical Japanese literature will also receive attention from Dr. Fryer.

The word "Oriental" has other well-known applications than to China and Japan, but it is known that Mr. Tompkins had these countries in view in making this early donation to the University. He had glowing visions of the expansion of commerce on the shores of the Pacific, and believed that our relations with these nations would assume the greatest commercial importance.

Professor Greene had leave of absence the first half of the year 1894-95, and resigned at the close of that year. Assistant Professor Ritter returned in 1895 from his year's absence in Europe. Instructor George M. Stratton has been absent on leave during two years, and now returns to take charge of the Psychological Laboratory in the Department of Philosophy. He has gained high distinction in his studies under Professor Wundt, at Leipzig, and has taken his degree *summa cum laude.* His thesis is to appear in Professor Wundt's *Studien.*

Summer Schools have been held in the Departments of Chemistry and Physics, and have been well attended, especially by teachers from the schools of higher grade. The Department of Biology has had charge of expeditions to the seaside. In two of the Engineering Colleges (Mining and Civil Engineering), a certain amount of summer vacation work is prescribed for the completion of the courses. It is desirable that summer work should be more largely organized, and put on a more substantial basis. There is a demand for instruction in a wider range of subjects during the long vacation, and the climate at Berkeley is very favorable for study in midsummer. The attendants on our Summer Schools this year have presented to the Board of Regents resolutions expressing their great satisfaction with the instruction given; and also asking, in the name of many teachers throughout the State, that courses be offered in a larger number of subjects. The subjects having the first claim are those which fit teachers for their specialties in High School instruction; to which must be added Pedagogy and Psychology. Continuous work cannot be done by the Professors the year round, and it needs a stronger teaching force to conduct these extra schools. But they are of great utility, and, like the University Extension Courses, are important means of increasing the University's power for good.

It is not necessary that all additions to the corps of teachers should be for full employment. Our "Organic Act" (Section 13) suggests the great utility of employing for "courses of instruction which are brief and special" a class of "non-resident professors." Taking this last phrase in a wide sense, it will not be difficult to secure for brief periods the services of men of literary or scientific repute as assistants for the expanding work of the University. They can spare a fraction of their time for special instruction in the subjects which enlist their chief interest. This will be true especially of Summer Schools at Berkeley, of Farmers' Institutes in different parts of the State, and of work in

Teachers' Institutes, as held in the several counties. It will be measurably true of University Extension Courses, although here our oldest and best known professors should be called on to do their part.

It is worth while to speak again of the difference between the permanent teachers and the transient. To the former, extraordinaries excepted, belong Professors and Associate Professors; to the latter, Assistant Professors, Instructors, and (to some extent) Assistants. Our procedure in appointing the second of these classes has not been quite consistent. As has been set forth in a previous report, Instructors cannot ordinarily expect to remain as fixtures in a University Faculty. Only a few can be promoted to permanent positions. The majority must come and go; and the usual term of their appointments should be for a single year. The conditions are similar for Assistant Professors; but this higher grade of instruction calls for appointment to a longer term of service. When the appointment expires, the University is under no obligation to renew it. We have sometimes announced that all such appointments are at the pleasure of the Board, and can be terminated at the close of any year without ground of complaint. But as recommendations for subordinate service are usually received from heads of departments, there is a delicacy of personal relations which may prevent the discontinuance of an indefinite appointment at the right time. For this reason it is better to regard all such service as a matter of fixed arrangement, its business side being so prominent as to eliminate personal claims and personal feelings. If one makes himself indispensable to a department, he may expect to be retained; otherwise he completes his contract and goes forth to win further recognition in some other field. It is often the best thing for a young man to know that he is to do journeyman service on his way to permanent professional work.

University Extension Courses have been given, as noted in the report of the Dean. To these may be added as virtual Extension work within the borders of the State, lectures before Teachers' Associations by numerous members of the Faculty, courses at the Coronado Summer School, and at Chautauqua gatherings at Long Beach and Pacific Grove. Not a few addresses have been given at the Commencement exercises of the High Schools.

Our University community has received an intellectual quickening in the Commencement weeks of the past two years, from addresses before the Philosophical Union. Last year two of our own graduates, Professor Royce, of Harvard University, and Professor Mezes, of the University of Texas, gave able addresses to as many hearers as could be crowded into our Gymnasium. These addresses, supplemented by criticisms from Professor Howison, president of the Union, and Professor Le Conte, were published, and have attracted much attention. This year Professor John Watson, of Kingston, Canada, gave a series of lectures before the

Union, and was greeted by a very appreciative audience. The Hon. Wm. T. Harris is engaged for a like service in December of this year.

Farmers' Institutes have been held in various parts of the State; and in connection with those in Southern California, the University has been fortunate in securing the services of Professor A. J. Cook, of the College at Claremont.

A special gathering of agriculturists and horticulturists was held, under local auspices, in August, 1895, at Camp Roache, in the Santa Cruz Mountains, with popular lectures at San José. The members of our Agricultural staff were called on to take an active part in these proceedings. The meetings were so successful that a similar gathering was held this year, with courses of lectures assigned to Professors Hilgard, Wickson, and Woodworth, and Instructor Hayne.

By a vote of the Regents, in June of this year, an expansion of the outside work for the benefit of California agriculture will continue during the ensuing year. A special appropriation was made to meet the contingent expenses of fifty agricultural meetings. Arrangements have been made for the first few series of these meetings, and they are already in progress. No expenditure of funds, it is believed, can more quickly and amply repay the State than that which is devoted to the diffusion of scientific intelligence among the cultivators of the soil. If no other benefit is reaped, at least many costly mistakes can be avoided. But positive benefits are sure to follow the knowledge imparted by thoughtful students of agriculture. The University can give much valuable information; and it expects to learn much from these conferences with practical agriculturists, horticulturists, and vineyardists.

Some recent publications in the newspapers of the State render it proper to speak again (see the last two Biennial Reports) of the service rendered to the State by our College of Agriculture. Its work is always twofold; one part carried on with the classes at Berkeley, the other and more important part that which is done for the State at large. Farmers' Institutes are only incidents in the aid this College is all the while giving to people at a distance from the University. It maintains a voluminous and continually increasing correspondence with individuals in all parts of the State. Calls for information are cheerfully responded to. The department is constantly examining or analyzing specimens sent by numerous inquirers. This work goes on through all the months of the year. The Experiment Stations, in different parts of the State, present constant object lessons in practical agriculture. The careful reports sent out from the college, on soils, fertilizers, adaptation of crops, dairying, stock-feeding, olive-growing, grape and vine culture, choice of fruits, resistance to insect pests, etc., are of exceeding value to the industries of the State. In the matter of reclaiming and utilizing alkali soils, the studies made by the Station workers have been of great practical service, and have received recognition wherever in the world such lands exist. The College of Agriculture, in such outside ways, is in intimate connection with all cultivators of the soil.

When we turn to the home-work of the College, we find that the chief criticism falls on its showing of graduates at Berkeley. That no more take the degree of this College cannot be due to any fault of organization or instruction. The Board of Regents acknowledge no lack of interest and effort in giving this College a foremost place. It receives its full share of the funds. The head of the College is one of the most distinguished scientific agriculturists in the whole country. Ample courses of instruction are provided in the wide field of agricultural study. These courses must be thorough, or they will not fully equip the graduates of the College to go forth and instruct the farmers of the State. The time is near at hand when agricultural subjects will be taught in the High Schools and Common Schools; and no one can face the children brought up on a ranch, who has not some superior knowledge to impart. Expert agriculturists will be wanted to spread information from the Experiment Stations, and to write up agricultural subjects in the weekly or daily press. Such teachers must go forth from an Agricultural College, and must have had thorough training there. Compare Director A. C. True's Report on Experiment Stations, for 1895, pp. 138–9, in which he says: "The development of Agricultural Colleges and Experiment Stations, and the increase in the number and importance of industries allied to agriculture, which demand workers trained in agricultural science, have made the need for thorough courses in Agricultural Colleges in this country more imperative. * * * In obedience to the growing demand for more thorough instruction, our Colleges of Agriculture are gradually raising the grade of their courses which lead to graduation and degrees."

With such provision as we have for the study of agriculture, whose fault is it, if comparatively few take advantage of the four years' curriculum and come out as graduates in agriculture? Do the farmers themselves send their sons to this chosen line of study? Do they give the needed impulse and enthusiasm to make young men love scientific farming? Let us begin further back, and put the spirit of agricultural study into the preparatory schools, and especially into the homes of the farmers.

The number of students in this College is not to be measured by the number of its graduates. Most of its students come for a shorter period of study than four years. They take special agricultural courses and return to their homes. But, more important still, a large number of four-year students enrolled in other Colleges of the University come into certain classes of the College of Agriculture. About one hundred have this year been enrolled in the classes of the Agricultural Professors and Instructors.

We have wished to maintain practical courses for those who can spend but a portion of the year in residence. This desire has been partially thwarted by the peculiarities of the California climate. In the far Northern States, during several winter months, the farmers' sons are relieved from field work. Here there is no such idle season: no month in the year can be called a farmers' vacation. But we still hope to find encouragement for short practical courses at Berkeley which will be attended by a very considerable number of special students.

It has been suggested that an Agricultural College does not thrive in a University, where many other lines of study are pursued. If that is true at Berkeley, it is not because of any preference shown to other studies. And the Regents are sure that it is not because of any feeling of disparagement, on the part of Regents, Faculty, or students. The College of Agriculture is held in equal honor with the other Colleges.

Why then are there so few graduates, in comparison with those of Agricultural Colleges which stand by themselves? In the first place, the comparison is most unfair. Segregated Colleges never confine themselves to agricultural studies. They teach a wide range of general studies, which with us are found in the other Colleges; sometimes even the classics, which are so much objected to; usually history and the studies preparatory to law; biology, and the studies preparatory to medicine; pedagogy, and the studies preparatory to professional teaching. Graduates of segregated Agricultural Colleges go into all those professions: it is a small minority who become professional agriculturists. This is true of all such Colleges that have a high grade of requirement for graduation. One of these, which was established early, on a narrow curriculum, and purposely placed far from other educational centers, gradually enlarged its range of studies to meet the requirements of its patrons, while remaining *par excellence* the Agricultural College of a great State. But in its last report we find the following reference to the students who take the course leading to a purely agricultural degree: "A most gratifying feature of the work of the year has been the increased number of students in the regular four years' course in Agriculture, there being now three Sophomores and three Freshmen entered in this course. While the number is comparatively small in itself, it is yet a marked increase over previous years." Of course many other students were all the while taking shorter courses in agriculture, or coming in from other courses in the College.

That is from one of the oldest of the segregated Agricultural Colleges. One of the youngest, which is still without buildings of its own, has a president who will teach "Mental and Moral Sciences," and a Professor who will teach "Latin and English." So hard is it, in any agricultural community, to satisfy the public with a narrow agricultural course. So sure is it that the farmers themselves are responsible for the failure to bring out a large number of thoroughly equipped graduates in agriculture.

It may be worth while in this connection to refer to the language of the Congressional Act "donating public lands to States and Territories which may provide Colleges for the benefit of agriculture and the mechanic arts": the donation is to be devoted to the "endowment, support and maintenance of at least one College, where the leading object shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, in such manner as the Legislatures of the States may respectively prescribe, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life."

The accrediting system has been continued with manifest advantage to the Preparatory Schools and to the University. In the year 1894–95 the usual appropriation was made for the expenses of visiting examiners. In 1895 the Regents sought to economize by cutting off this appropriation. It was thought that the work might be allowed to lapse for a single year. But numerous protests came from all parts of the State, affirming the great advantage to the schools of the accrediting system, and the harm which would ensue from a single year's cessation. It was strongly averred that this connection of the University with the High Schools had been of the greatest service to the schools. Influenced by these calls, the Regents at last made half the usual appropriation, which was used to the best of their ability by five of the leading departments in the University. The number of accredited schools in 1894 was 48; in 1895, 57; in 1896, 67, of which 52 are public High Schools in all parts of the State.

The time has come to have a clear understanding of the relations involved in this accrediting system. They seem simple enough, but in certain quarters they have been objected to as bringing an arbitrary power to bear on the schools and on individuals.

Accrediting was first introduced here in imitation of the system employed at the University of Michigan. But it was made more thorough in its working, by commissioning a larger corps of examiners. We send out experts in all the leading subjects required for entrance to the College classes. We accredit the school only in those branches in which it makes a satisfactory showing. In addition to the school diploma, we require the personal recommendation of the Principal of the school. When these conditions are met, the students from accepted schools come in without examination in all the accredited branches of study.

Accrediting is entirely voluntary on the part of the schools. The

University sends its examiners only in response to a request from the schools. It is simply, first, an offer of help to the schools, in determining the probable standing of a school in comparison with the other schools of the State; and, secondly, a privilege granted to the graduates of the schools, of coming in without examination at the University. This privilege is greatly prized, and of course it exerts an influence in favor of accrediting. But it must be repeated, that the University itself brings no sort of pressure to bear on any school for becoming accredited. The almost universal request for accrediting arises from the manifest advantages of the system; a system which has now found wide favor throughout the land, and has been adopted (in a less perfect form than our own) in some of the oldest Eastern colleges.

We do not claim that our decisions as to accrediting are infallible. If we err, it is probably on the side of a negative conservatism. We regard the concession as one to be granted cautiously, and where it is not likely to be soon forfeited. In addition to the visits of the examiners, two additional safeguards are resorted to: specimen papers of the regular work of the school; and (after accrediting) a record of the early college work of recommended students. The University has no private ends to gain in all this procedure, it has no personal grudge to gratify. If its decisions affect individuals unpleasantly, it is only incidental to the working of a system which must have less regard to individuals than to the larger interests of the school system of our State. We must insist on a proper University standing, such as is maintained by other first-class Universities; and we cannot maintain such a standard without fit preparation on the part of all incoming students.

As the schools multiply, it becomes a question whether the increasing burden of the examiners' traveling expenses should be borne by the University alone out of its all too scanty general fund. The work is preëminently one for the benefit of the High Schools, as a part of the State system of education.

Professor Joseph Le Conte has taken a half-year's leave of absence, to attend various meetings of Scientific Associations in this country and Great Britain. He will give the President's address before the American Geological Society. He will also represent us at the Princeton celebration in commemoration of the founding of the College of New Jersey, one hundred and fifty years ago. On his return, Dr. Le Conte will devote much of his time to graduate instruction, and hand over to Associate Professors the chief portion of his undergraduate work.

Assistant Professor Leuschner is to be absent for a year, on half-pay. For several years the Board of Regents has been inclined to adopt the Harvard and Cornell plan of a "Sabbatical year," by which a professor, after six years of work, gains a year off with half-pay, for study elsewhere. It is thought very desirable that University men take such leaves of absence, for their own benefit and for the increased value of their teaching service. With us the inducement of half-pay has not proved as strong as at those Eastern institutions. We are so far from European Universities, the expense of travel is so great, that our young Professors are not encouraged to take their Sabbatical year. This is to be regretted; and it raises the question of reverting to some procedure more like that of former years, when some one or more of our force received leave for a year without loss of pay.

At the meeting of the National Educational Association last year, at Denver, the University was represented by Professors Le Conte, Hilgard, and Bacon. The Association met this year at Buffalo, and Professors Brown, Clapp, and Merrill were in attendance.

Professor Brown was also commissioned to represent this University at a meeting of the "Land Grant Colleges," held the same week in Buffalo. An important bill has been introduced in Congress for a grant of supplementary lands to the institutions fostered by the acceptance of the Morrill grant of 1862. The measure is a very important one, especially for the States which, like California, received a much smaller allotment than they would have been entitled to with their present population. The Bill, which is in the nature of an equalizing measure, will be pressed forward in the next Congressional session. It is worthy of serious consideration by our Legislature, that our Senators and Representatives may be stimulated to give it effective support.

At last a movement has been begun to which we have been looking forward ever since the administration of President Gilman. He invited the establishment of independent Seminaries of learning alongside of the University, especially by the various religious denominations. It seemed a wise economy for all educational interests of the higher grade to plant themselves in the neighborhood of the State's University, and avail themselves of the facilities it provides, to which all Californians are equally entitled. Special instruction could be given at the outside home in any subjects emphasized by its founders. More than twenty years ago one religious body purchased a lot in Berkeley, with a view to establishing such an outside home. The project was given up for the time, but it has been constantly borne in mind, and publicly advocated by successive Presidents of the University.

The "Christian Church" has now taken decisive action, and this year it organizes a Seminary in Berkeley. Two professors, Dr. S. M. Jefferson and Rev. A. M. Elston, are in charge of the enterprise, and propose to offer certain courses of instruction in their Seminary. For other courses, their students will enter the University on such footing as they choose, either as regular, or limited, or special students. They come in, of course, on precisely the same terms as other students, and enjoy all the advantages of the University. The economy of this arrangement is evident. Its influence on these new students ought to be helpful, as they are introduced to a wider range of studies and a larger companionship with teachers and fellow-students. Its influence on the University cannot be otherwise than good, so long as these added groups of students are earnest and high-minded, as from the circumstances of their coming they would presumably be. It is proper to add that this movement is more advanced in other States than in our own. Michigan and Missouri are examples of States in which such independent and unaffiliated but coöperating Seminaries have been established, and have shown the wisdom of their founders.

The number of students in attendance at the University during the last two years has been as follows:

Year.	At Berkeley.	In San Francisco.	At Mt. Hamilton.
1894–95	1,124	655	8
1895–96	1,336	717	3

Deducting the few duplicated names, the totals were, for 1894–95, 1,781; for 1895–96, 2,047.

The class entering in the new year, 1896–97, is considerably larger than that of 1895–96.

A comparative table for the last six years gives the following numbers in the various departments of the University. They show, as in former reports, a remarkable increase in attendance:

	1890–91.	1891–92.	1892–93.	1893–94.	1894–95.	1895–96.
In Academic Departments at Berkeley:						
Men	352	383	446	541	725	811
Women	105	164	204	274	399	525
Totals	457	547	650	815	1,124	1,336
At the Lick Observatory:						
Men	3	4	6	5	6	3
Women	0	0	0	2	2	0
Totals	3	4	6	7	8	3
In the Colleges of Law, Medicine,* Pharmacy, Dentistry, and Veterinary Science, and in the Mark Hopkins Institute of Art, in San Francisco:						
Men	302	378	415	474	576	598
Women	9	12	20	92	79	119
Totals	311	390	435	566	655	717
Total in the University (deducting for duplicates)	771	941	1,091	1,383	1,781	2,047

*Including the Post-Graduate Medical Department.

The numbers graduated from the several Colleges during 1895 and 1896 have been as follows:

		Colleges of General Culture.	Colleges of Applied Science.	Law.	Medicine.	Pharmacy.	Dentistry.	Totals.
In 1895.	Men	53	24	33	24	25	38	197
	Women	38	1	2	2	0	0	43
	Totals	91	25	35	26	25	38	240
In 1896.	Men	57	33	47	44	26	47	254
	Women	46	1	0	7	0	5	59
	Totals	103	34	47	51	26	52	313

The following table shows the increase in the teaching force of the Colleges at Berkeley:

Table showing the Number of Professors, Associate Professors, Assistant Professors, Lecturers, Instructors, Assistants, and Fellows in the Colleges at Berkeley during Each Academic Year—Compiled from the Annual Registers.

Year.	Professors.	Associate Professors.	Assistant Professors.	Lecturers.	Instructors.	Assistants.	Fellows.	Totals.
1890–91	17	5	5	2	8	11	--	48
1891–92	17	8	8	--	13	12	2	60
1892–93	16	9	10	1	19	18	4	77
1893–94	17	9	12	--	20	23	7	88
1894–95	21	9	12	--	24	17	7	90
1895–96	21	10	13	--	26	18	6	94

A comparison of the years 1890–91 and 1895–96, in the numbers of students and the numbers of Instructors, will show how much the average size of the sections, as handled in the various lecture and recitation-rooms, must have increased. They were quite large enough in the former year; now many of them are too large for the best results in instruction. There is more elective and more graduate work than five years ago; and both these factors tend to reduce the size of the sections. Yet the average size of the sections taught by the whole Faculty is at least thirty per cent greater than it was. The increase is greatest in the standard studies of the first two years. That means that some sections in Mathematics, English, History, Latin, Chemistry, Physics, etc., are very much overcrowded. For example, the Department of Mathematics has sections twice or thrice as large as can be thoroughly cared for. The same is true in the modern language departments.

The inference is too plain to need a formal statement. We are in pressing need of larger funds for our salary list. The number of students has very far outrun any increase in our stated income. It is impossible to go on with a larger disproportion between income and necessary outlay. To say nothing of other expenses, the cost of instruction alone has brought the University to an acute financial crisis.

In noting the expenses of the University, it must be remembered that a very considerable sum is demanded every year by the Lick Observatory, of which we are justly proud. The gift of Mr. Lick was almost entirely used up in providing the magnificent plant at Mount Hamilton. The running expenses of the Observatory are over $20,000 a year, of which a round $17,000 comes out of the University funds, with pressing demands for additional workers.

Another thing is to be borne in mind, viz., that every enlargement of the work of the University involves an increase in the running expenses. If a new building is put up, it must have new furniture and equipment. The machinery will suffer wear and tear. The fires demand a new coal supply. A separate janitor must be employed. The surrounding grounds must receive additional care. A large institution, however economically managed, needs a large contingent fund for its maintenance.

The Board of Regents has been much concerned with the financial problem above referred to. Various propositions have found utterance in its counsels. A few Regents have suggested a tuition fee, such as is charged in some other State Universities. More of our number have strongly advocated an incidental fee, such as is now paid, under one name or another, in almost all State Universities. This proposition was voted down by a narrow majority; the opposition to it being based largely on the old and generous Californian feeling that no slightest barrier must be put in the way of those who wish for an education. Still another proposal has been made, to meet the pressing needs of instruction by an overdraft on the future. But this, too, has seemed impracticable. Many would regard it as a business impropriety, and all recognize the fact that the hard times prevailing throughout the State make it hazardous to count on legislative appropriations for any considerable deficit. These propositions being all put aside, we are compelled to spend another year under an aggravation of the financial difficulty. A still larger number of students must be provided for than in any year preceding. We have invited them to our doors, and we cannot turn them away without ample notice of a change of policy.

The Board of Regents would now lay this difficulty before the people of the State, as represented in the coming session of the Legislature. The University is the people's institution, established for their benefit, founded by them with help from the National Government, generously encouraged by them from time to time, and fostered by the grant of a permanent fractional tax. These provisions were adequate for a time. But the growth of the University has exceeded all our expectations. The number of students has more than trebled within the last six years, with little increase in resources, and a crisis has thus been thrust upon us. The people of the State must deal with this new situation, and decide how they wish *their* University to be carried on.

There would appear to be but three choices of method for the University's future. First, to retrace the steps which seem to have pledged us to the principle of absolutely free tuition. This would bring on a strenuous contest, and might necessitate an amendment to the State Constitution. It is not a method of speedy relief. Secondly, a reduction in the number of students. If we have funds for the proper instruction of only 1,000 students, let that be the maximum number admitted. A few portions of the State which have not now their full quota, would not be immediately affected; but many of the most populous counties would suffer a serious reduction. This course would give us a unique reputation among the Universities of the land. All other Universities rejoice in a continued and healthful growth. Other State Universities make provision for all who are prepared to enter. We should lose the small but desirable contingent coming from outside our State. Our graduate department would be struck with paralysis; and graduate study is now a necessity for any first-class University. Thirdly, the natural method would be to increase the amount of State aid. The appropriations heretofore made for buildings met existing demands. The fractional tax aimed to give just the needed subsidy for instruction. Now that the rapid growth of the University renders that aid insufficient, the State is reasonably asked to make it sufficient—just that and nothing more. The next Legislature will be called on to decide whether this is the method the people wish to have adopted.

Other States are now assigning to the support of their Universities a larger fractional tax than ours. For example, Michigan, whose University has become the pride of the State, gives a tax of one sixth of a mill on the dollar; ours is only one tenth. Minnesota gives three twentieths of a mill, half as much again as ours; Indiana, one half of a mill for thirteen years, for endowment. Wisconsin grants a permanent tax of one eighth of a mill, with an additional one tenth for six years for buildings, and another tax yielding $10,000 a year. Missouri gave to its University, in four years, appropriations amounting to nearly $1,300,000.

It is an old story, told in former reports, that the Colleges at Berkeley are in great need of additional buildings. The need was recognized by the committees of the last Legislature. If another University plea of older urgency had not stood in the way, we doubt not that an appropriation would have been willingly granted for buildings at Berkeley. The intervening two years have made the pressure upon us still harder to bear. There are several hundred more students, many more sections to be accommodated. Lecture-rooms, recitation-rooms, laboratories, have been overcrowded by the larger numbers. Our only Assembly Hall has been cut up for recitation-rooms, and there is no place where the new Freshman Class can be gathered. Literary and scientific sections are alike distressed for room, and, as usual, science makes the most pressing claims. The young women in the University, now numbering over 500, have but the poorest accommodations in their overcrowded study and lunch rooms.

Recent action taken by the Board of Regents is an assurance that appropriations for buildings at Berkeley will be wisely expended. A plan for permanent and harmonious structures will be sought for from architects of the highest ability. While the older buildings will not be discarded, but live out their useful lives, every new building will be put in its fitting place, and become an integral part of a far-reaching plan. The beautiful slopes and contours of the University site will lend themselves to picturesque effects of the highest architectural interest.

In consequence of the increased number of students pursuing post-graduate studies, the Academic Senate has established a Graduate Council, to relieve the Academic Council from the care of the graduate students. The enrolled graduates have themselves formed a Graduate Club, which promises the best results in unifying this important body of advanced students. This club coöperates with other clubs in all the leading Universities of the country, in preparing an account of the graduate courses offered at the different institutions. Our experience shows already the need of fostering this advanced department of study. It is the last stage in our educational series, and is needed for the full equipment of Instructors in College courses, and for the better equipment of teachers in the High Schools. If we fail to have a good graduate department, our ambitious young scholars must go abroad for their higher degrees, or yield the most important positions in School and College to strangers who have had superior advantages.

The work of the past two years has shown fidelity on the part of Instructors and students. The number of courses given in 1894–95 was 295; in 1895–96, 313.

Physical culture is now required of young men in the two lower classes three times a week. The Gymnasium is overcrowded, and the lack of accommodations prevents us from making these exercises obligatory for the young women as well as for the young men. There are large volunteer classes of young women, under the care of Mrs. Magee, wife of the Director. This department is among those which are suffering most for lack of new buildings. There is a new interest felt in the introduction of physical culture in the schools of the State. The demand for this will require special training for many of the teachers who go out from the University, and put on this department a new and large responsibility.

The Military Department has grown in importance, and the battalion now numbers over 500. An armory is more than ever a pressing need.

It is expected that provision will be made for a valuable series of lectures, beneficial alike to the Military and Physical Culture Departments.

Athletics come in as a voluntary supplement to the military drill and the exercises of the Gymnasium. The ideal admixture of athletics has not yet been realized. In some cases there is an encroachment on the more important work of the College curriculum. The Faculty endeavor to guard against this tendency, and in no case do they condone poor scholarship on athletic grounds. Their chief regret is that only a minority of the young men obtain the benefit of such hardy outdoor exercise. It is not an ideal condition, when one fifth of the young men represent the student body on the campus, and four fifths are merely spectators. It would be a gain if games of precision, calling for the most laborious practice, were supplemented by styles of play in which all are invited to join.

In the absence of dormitory buildings, there is an increasing tendency among the students to find homes in fraternity houses. Several new fraternities have been introduced within the past two years. These fraternity families depend for their healthful tone on the individual members. At the best, they form pleasant and profitable homes for high-minded and earnest students. With an inferior constituency, they may exert an unfavorable influence, leading to a waste of time, or even a deterioration of character. It is highly important that a young man should have time to act deliberately in the choice of his fraternity companions. Such deliberation is at present impaired by the haste with which pledges are obtained from new-comers. Parents should advise their sons to defer their fraternity membership till they have come to feel at home in the University, and can be sure of the fellowship they enter. This close bond of daily comradeship is one which is to have a very marked influence on their student lives. The fraternities themselves should agree to postpone pledging for at least the first term of the Freshman year. It requires a mutual understanding in order that no unfair advantage may be taken. Such a change from the present method would be beneficial alike to the new students and to the fraternities. Natural affinity would take the place of hasty and incongruous affiliation.

Interesting statistics will be found in the appended Report of the Dean, Professor Irving Stringham.

Since the last report, the California Veterinary College has been affiliated with the University. Appended are reports from the Deans of the Professional Colleges, and the Secretary of the San Francisco Art Association. It will be seen that these departments have shared in the general prosperity of the University.

All the Professional Schools have increased their requirements for graduation, thus keeping in the front rank.

After years of waiting and successive disappointments from adverse gubernatorial judgment, the Professional Colleges in San Francisco obtained an appropriation of $250,000 from the last Legislature for the erection of new buildings in San Francisco, on a common site. A valuable and commanding site was offered by the Hon. Adolph Sutro, and was accepted by the Board of Regents. The plans of the buildings were thrown open to competition; those presented by Messrs. Krafft, Martens, and Coffey were chosen, and the work of construction is to go forward as rapidly as possible. The following vote of thanks to Mr. Sutro was passed at a meeting of the Board held May 19, 1896:

> *Resolved,* That in view of the generous donation of the said site for the Affiliated Colleges heretofore accepted, and the noble plans undertaken and promised by the Hon. Adolph Sutro, as expressed in his letters above set out for founding and endowing a great public library in connection with said Colleges, this Board does now gratefully accept said undertakings so expressed in said letters, and in consideration therefor wil proceed to erect said College buildings upon said site as provided by law, and will earnestly further the design of the Hon. Adolph Sutro in founding and completing the said Library and Library Building; further
>
> *Resolved,* That the Board takes this occasion to express its profound appreciation of the public spirit, devotion to learning, and the good of the commonwealth, so splendidly manifested by the Hon. Adolph Sutro.

The San Francisco Art Association is steadily gaining ground, in the Hopkins Institute, donated by Edward F. Searles, Esq. James D. Phelan, Esq., and Horace G. Platt, Esq., have been Presidents of the Association for the two years under review. Mr. Searles has shown continued interest in the Institute by additional presents and assistance. Valuable collections of paintings have been received from Mrs. Phebe A. Hearst and Mrs. Mary A. Avery; gifts of pictures and books from many others. James D. Phelan, Esq., gave $1,000 to be awarded for pictures painted by California artists.

J. Clute Wilmerding, Esq., made a bequest for an industrial school, and put the trust in the hands of our Board of Regents. The money has been turned over to them, and invested in approved securities. The site of the school is to be definitely determined at the November meeting of the Regents.

Full Annual Reports from Director Holden on the work of the Lick Observatory will be found appended to the Secretary's reports. An expedition to Japan for observing the August eclipse of the sun was conducted by Professor Schaeberle, who was so successful in his expedition to South America, in 1893. One of our Regents, Charles F. Crocker, Esq., bore the expense of this expedition ($2,500), and deserves as sincere thanks as if the skies had been more propitious. A very valuable addition has been made to the equipment of the Observatory by Edward Crossley, M.P., F.R.A.S., of Halifax, England, a noted amateur astronomer. He was in possession of a three-foot reflector, built by Dr. A. A. Common. On deciding to part with it, he generously gave it to us, choosing the Lick Observatory as the place where this fine instrument would be of most service to science. It is a splendid gift, and one which strikingly shows the international union of sympathies in the scientific world. The cost of transporting and remounting this telescope was borne by numerous friends of the Observatory in this State. As Director Holden remarks: "We have contributions from Regents of the University, from a member of the Academic Senate, from a member of the Alumni, from the Astronomical Society of the Pacific, from the Society of California Pioneers, and the California Academy of Sciences, from bankers, manufacturers, railway officials, lawyers, men of business, capitalists—both men and women." The total money gifts were over $5,000. The Southern Pacific Company and the Wells-Fargo Express Company furnished free transportation, thus saving us thousands of dollars. Messrs. Percy & Hamilton, architects, of San Francisco, gave their services in the erection of a new dome on Mount Hamilton. Miss Caroline W. Bruce, of New York, gave $500 to provide a special spectroscope for this telescope; also, a new driving-clock. Mrs. Hearst gave $100 for preliminary experiments in photographing the solar corona. Dr. A. Blair Thaw, of Santa Barbara, has presented a special piece of apparatus for the same use. Professor Weinek, of the Observatory at Prag, has coöperated with the Observatory, as heretofore, in enlarging the photographs of the moon. W. W. Law, Esq., has made a gift of $1,300 for the publication of an Observatory Atlas of the Moon.

Mount Hamilton has sustained a loss in the resignation of Professor E. E. Barnard, whose brilliant work has reflected credit on the Observatory. Since his acceptance of a position in the Yerkes Observatory, he has raised in San Francisco a fund for the publication, in our L. O. series, of illustrations of his Milky Way and Comet photographs. Professor W. S. Hussey has taken the place of Professor Barnard at Mount Hamilton.

Director Holden asks for the strengthening of his little band of astronomers. He claims a fellowship as an immediate necessity. In comparison with other celebrated Observatories, the Lick Observatory is very imperfectly manned. Its salary roll, he thinks, should be increased at once by $3,600; with a budget apportionment of $7,500 additional. At that figure it would be by far the most economically conducted of the great Observatories. He calls attention to the need of purchasing adjacent bits of land on Mount Hamilton.

The number of visitors registered at the Observatory the past year was 4,838; the total number from June 1, 1888, to June 1, 1896, is 43,536. On the 25th of August of this year, one hundred years since the birth of

James Lick, a memorial day was observed at Mount Hamilton, where the remains of Mr. Lick find a tomb under the great telescope.

Mr. Herman Royer, a business man of San Francisco, some years ago made a will, by the terms of which most of his estate was to be given for founding a chair of Political Economy in this University. After Mr. Royer's death, which occurred last year, it was found that his property was so much encumbered as to defeat his good intention in the matter. If the University gains nothing more, it will have the benefit of his excellent example. Such a bequest should cease to be a rarity. Mrs. Julie Rosewald has generously given a considerable sum for the founding of a scholarship in memory of her deceased husband. Mrs. Phebe A. Hearst, who many years ago established eight scholarships for young women, last year added four more temporary scholarships. Twelve worthy young women are now recipients of her benefaction. James D. Phelan, Esq., of San Francisco, has given $500 for the support of a Fellow in Argumentation during the present year. He does this in the hope that, if the experiment is a success, the Regents may find themselves able to continue the Fellowship another year, or that others interested in debating may combine to place the Fellowship upon a permanent foundation.

The Library of the University has been enriched by many minor gifts of books, and by some of larger extent. Noteworthy are the following: 403 volumes of Law Reports and Digests, presented by the Bancroft-Whitney Company and nine Alumni of the University; 50 volumes of the "Challenger" Reports, presented by the Government of Great Britain; numerous volumes and manuscripts on Quicksilver Mining from J. B. Randol, Esq.; 44 volumes of the Iron Age, from Regent A. S. Hallidie; 26 volumes on Engineering and Metallurgy, from Marsden Manson, Esq.; a set of San Francisco Municipal Reports, from Wm. Alvord, Esq.; California Authors, 29 volumes from S. P. Avery, Esq., and more from others; 100 volumes for the Department of Physics, from Miss Rose Standish Whiting. Portraits of Benjamin Parke Avery, from his brother S. P. Avery, and of Dr. Horatio Stebbins, have been placed in the Library. The presentation of the latter portrait, by John Perry, Esq., and other donors, was a pleasant feature of the Charter Day exercises, March 23, 1896.

Messrs. Levi Strauss, Louis Sloss, J. L. Flood, and G. W. McNear have made a donation of $250 each for lighting the Library. Many citizens of Berkeley gave another $1,000 for lighting the grounds, one half the sum coming from Frank M. Wilson, Esq. Four gentlemen of San Francisco, two of them now Regents, gave $100 to the Department of Astronomy.

C. Pischli, Esq., donated mountings for the Students' Observatory. A friend presented one hundred iron settees for use on the grounds. The

Berkeley Electric Lighting Company makes a very generous donation toward lighting the University grounds.

Valuable gifts have been received from the General Electric Company, San Francisco, through Dr. Thomas Addison, Manager; from the Union Iron Works; from Professor George Davidson; and from others.

It is proper to notice as gifts the gratuitous service rendered in teaching. Professor Jacob Voorsanger, D.D., of San Francisco, has for two years given two forenoons in each week to classes in his department of Semitic Languages and Literature. J. C. Merriam, Ph.D., now an Instructor, performed a year's gratuitous work in the Department of Palæontology. There have been Honorary Fellows and Assistants in several departments, who received no compensation for valuable services. On the University grounds Mr. John McLaren, of the Golden Gate Park, has given advice and time with his characteristic public spirit.

And why may we not count the gift of the student body, who turned out in large numbers to make a new roadway in the University grounds, improved existing paths, and leveled the rocky ground about some of the buildings? The University had not the funds to pay for these improvements, and hundreds of the students, day after day, wielded the pick and the shovel, doing jobs that would have cost thousands of dollars. An incidental benefit of this work is the light thrown on the character of our students. As a class they know how to work, and are not expecting to live lives of luxury and idleness. A very considerable percentage are partly or entirely supporting themselves in their four years of study. A Students' Aid Society has been formed, which is a medium of communication between needy students, both men and women, and those who can give them employment.

Appended is a list of the published writings of members of the Faculties since the printing of the former lists.

The customary financial statement is also subjoined. The report of the Secretary of the Board gives full details of the Board's business transactions.

Respectfully submitted.

MARTIN KELLOGG,
President of the University of California.

SUBSIDIARY REPORTS.

Of the Dean of the Colleges at Berkeley.

Of the San Francisco Art Association.

Of the Dean of the Medical Department.

Of the Secretary of the Post-Graduate Medical Department.

Of the Dean of the College of Dentistry.

Of the Dean of the College of Pharmacy.

Published Writings of Members of the Faculty.

Financial Statement.

REPORT OF THE DEAN OF THE COLLEGES AT BERKELEY.

To the President of the University:

Dear Sir: I have the honor to submit herewith the following report on attendance and courses of instruction in the Colleges of Letters, Agriculture, Mechanics, Mining, Civil Engineering, and Chemistry, for the academic years 1894–95 and 1895–96.

The following table gives the number of students in attendance each year from 1885–86 to 1895–96, inclusive, classified by status. The upper figures on the left of each column refer to young men, the lower to young women; the numbers in the lower right-hand corner of each group are the totals:

Enrollment by Classes.

	1885–86.	1886–87.	1887–88.	1888–89.	1889–90.	1890–91.	1891–92.	1892–93.	1893–94.	1894–95.	1895–96.
Grad.	11 2 13	8 1 9	8 4 12	15 0 15	15 6 21	20 5 25	22 15 37	34 13 47	43 21 64	60 40 100	73 45 118
Sen.	13 4 17	29 5 34	29 3 32	34 4 38	32 7 39	40 4 44	28 8 36	27 10 37	44 22 66	79 34 113	83 47 130
Jun.	30 5 35	37 4 41	34 3 37	36 8 44	45 6 51	29 7 36	32 12 44	36 9 45	38 19 57	106 44 150	126 61 187
Soph.	40 4 44	45 5 50	40 10 50	53 13 66	34 12 46	43 12 55	46 8 54	47 14 61	48 23 71	136 62 198	204 102 306
Fresh	63 6 69	68 8 76	75 18 93	80 13 93	76 18 94	67 11 78	75 19 94	65 18 83	79 25 104	231 109 340	211 122 333
At Large	11 0 11	14 1 15	26 2 28	31 5 36	54 11 65	82 26 108	113 45 158	148 64 212	182 75 257	-------- --------	-------- --------
Spec'l	12 4 16	16 5 21	21 5 26	27 12 39	26 17 43	30 17 47	41 40 81	58 53 111	62 66 128	72 80 152	77 108 185
Lim.	27 18 45	26 16 42	19 9 28	15 17 32	26 16 42	42 22 64	26 17 43	31 23 54	45 25 70	41 30 71	37 40 77
Totls.	207 43 250	243 45 288	252 54 306	291 72 363	308 93 401	352 105 457	383 164 547	446 204 650	541 274 815	725 329 1,124	811 525 1,336

Classified by College as well as by status, the statistics of attendance during the past two years are as follows:

ACADEMIC YEAR 1894–95.

GRADUATES.

Cand. Ph.D.	Cand. A.M.	Cand. M.L.	Cand. M.S.
16 4 20	9 5 14	4 8 12	4 1 5

Graduates pursuing Special Subjects	Total Graduate Students
27 22 49	60 40 100

UNDERGRADUATES.

	Sen.	Jun.	Soph.	Fresh.	Sp.	Lim.	Totals.
Letters	15 8 23	12 5 17	15 9 24	24 14 38	3 3 6	4 1 5	73 40 113
Social Sciences	34 23 57	44 36 80	60 50 110	108 82 190	21 48 69	21 28 49	288 267 555
Natural Sciences	4 2 6	4 2 6	3 3 6	7 9 16	5 8 13	1 0 1	24 24 48
Agriculture	0 0 0	1 0 1	3 0 3	3 1 4	7 1 8	0 1 1	14 3 17
Mechanics	6 0 6	20 0 20	26 0 26	36 0 36	7 6 13	7 0 7	102 6 108
Mining	5 0 5	2 0 2	11 0 11	12 0 12	8 0 8	1 0 1	39 0 39
Civil Engineering	8 0 8	14 0 14	11 0 11	26 0 26	12 10 22	2 0 2	73 10 83
Chemistry	7 1 8	9 1 10	7 0 7	15 3 18	9 4 13	5 0 5	52 9 61
Totals	79 34 113	106 44 150	136 62 198	231 109 340	72 80 152	41 30 71	665 359 1,024

Total in the Colleges at Berkeley	725 399 1,124

ACADEMIC YEAR 1895–96.

GRADUATES.

Cand. Ph.D.	18 5	23
Cand. A.M.	16 8	24
Cand. M.L.	2 8	10
Cand. M.S.	5 2	7
Cand. C.E.	1 0	1
Graduates pursuing Special Subjects	31 22	53
Total Graduate Students	73 45	118

UNDERGRADUATES.

	Sen.	Jun.	Soph.	Fresh.	Sp.	Lim.	Totals.
Letters	11 4 15	14 10 24	19 12 31	19 19 38	3 5 8	5 3 8	71 53 124
Social Sciences	35 37 72	58 49 107	93 77 170	98 91 189	30 76 106	20 36 56	334 366 700
Natural Sciences	7 5 12	6 2 8	8 11 19	13 11 24	4 11 15	1 0 1	39 40 79
Agriculture	2 0 2	1 0 1	3 1 4	2 0 2	2 2 4	1 1 2	11 4 15
Mechanics	9 0 9	25 0 25	37 0 37	32 0 32	13 8 21	4 0 4	120 8 128
Mining	0 0 0	9 0 9	19 0 19	20 0 20	10 0 10	2 0 2	60 0 60
Civil Engineering	11 0 11	8 0 8	15 0 15	12 0 12	8 2 10	1 0 1	54 2 56
Chemistry	8 1 9	5 0 5	11 1 12	15 1 16	7 4 11	3 0 3	49 7 56
Totals	83 47 130	126 61 187	204 102 306	211 122 333	77 108 185	37 40 77	738 480 1,218

Total in the Colleges at Berkeley	811 525	1,336

The numbers of persons upon whom degrees have been conferred during the past five years, on the recommendation of the several Faculties at Berkeley, are given in the following table. In a few instances a degree (or possibly more than one degree) was conferred before or after Commencement. The statistics are, in each year, except 1896, for the calendar year—January to December, inclusive:

Name of Degree.	1892.		1893.		1894.		1895.		1896.*	
Sc.D.†	--------		2 0	2	--------		--------		--------	
Ph.D.	--------		1 0	1	2 0	2	--------		2 0	2
A.M.	1 1	2	2 0	2	4 1	5	2 1	3	3 1	4
M.L.	0 2	2	--------		--------		2 2	4	1 4	5
M.S.	--------		0 1	1	2 0	2	--------		4 1	5
Number of higher degrees	1 3	4	5 1	6	8 1	9	4 3	7	10 6	16
A.B.	8 3	11	9 1	10	13 5	18	14 8	22	11 4	15
B.L.	6 4	10	2 7	9	15 14	29	15 18	33	10 23	33
Ph.B.	13 8	21	20 9	29	10 14	24	16 6	22	23 10	33
B.S.	15 2	17	21 1	22	22 2	24	28 4	32	35 5	40
Number of Bachelor's degrees	42 17	59	52 18	70	60 35	95	73 36	109	79 42	121

*To August 10th. † Honorary.

There were given by lecture, recitation, laboratory experiment, in the drawing-room and in the field:

295 courses of instruction during the year 1894–95.
313 courses of instruction during the year 1895–96.

The enrollment in the various classes is exhibited in the following table:

ENROLLMENT IN THE COURSES OF INSTRUCTION FOR THE YEARS 1894–95 AND 1895–96.

NOTE.—An unbroken line in column headed "No. of Students" indicates that there is no report on the course. A dotted line in column headed "No. of Students" indicates that the course was not given.

Instructor.	Title of Course.	No. of Hours a Week.		No. of Students in Attendance.	
		One Term	Two Terms	1894–95	1895–96
	PHILOSOPHY.				
Howison; Henderson; Henshaw	1. Formal Logic	4	......	95	144
Howison; Henderson; Henshaw	2. Elementary Psychology	4	......	35	122
Howison; Henderson; Henshaw	3. Introduction to Philosophy, History of Philosophy from Thales to Kant, inclusive	4	......	20	25
Howison	4. Elementary ethics, including Civil Polity	......	2	22	6
Howison	5. The Philosophy of Kant	......	2	19	8
Howison	7. The Philosophy of Plato	......	4	......	10
Howison	8. Hegel's Logic. Seminary	......	3	2	......
Howison	8. Hegel's Logic. Seminary	......	4	......	3
	PEDAGOGY.				
Brown	1. The Practice of Teaching; lectures and observation in schools	4	......	16	22
Bailey	1. (b) Recitation and School Visitation	2	......	13	
Bailey	2. (a) School Supervision: Text-book and Lectures	2	......	34	36
Bailey	(b) Visitation of Schools: organization, grading, management	1	......	7	12
Bailey	3. The History of Education: Earlier periods, to time of Rousseau	3	......	65	96
Bailey	4. The History of Education: The Latest Period, from time of Rousseau to present	3	......	63	82
Brown	5. The Theory of Education	4	......	20	39
Brown	6. School Systems: origin and development, etc.	2	......	......	54
Brown	7. Seminary for the study of special problems in Education	......	2	42	31
Brown; Bailey	8. Graduate Seminary for the systematic study of child-life	......	......	——	——
Bailey	9. Biological Aspects of Education. Primarily for graduates	......	......	9	8
	JURISPRUDENCE.				
Jones	1. Formation of the Federal Constitution	1	......	6	9
Jones	2. Constitutional Law of the United States	......	2	32	45
Jones	3. Principles of International Law	2	......	22	27
Jones	3A. The Monroe Doctrine	1	......	......	12
Jones	4. History of International Law	2	......	8	7
Jones	5. Roman Law	4	......	26	30
Jones	7. Principles of Jurisprudence	4	......	33	22
	HISTORY AND POLITICAL SCIENCE.				
Plehn; Leach; Day	1. History of Europe during the Middle Ages	4	......	184	150
Bacon; Leach	2. Constitutional History of England	4	......	178	122

ENROLLMENT IN THE COURSES OF INSTRUCTION—Continued.

Instructor.	Title of Course.	No. of Hours a Week.		No. of Students in Attendance.	
		One Term	Two Terms	1894–95	1895–96
Bacon	3. History of Europe from the Reformation to the French Revolution	4	------	98	113
Bacon	4. Political History of the Nineteenth Century	4	------	97	90
Hayne	5. History of the United States; general view	4	------	43	59
Haynes	6. History of the United States; critical study of special topics	4	------	34	
Plehn; Haynes	7. Elementary Political Economy	4	------	58	96
Bacon	8. Comparative Constitutional Law	4	------	34	40
Moses	9. Spanish-American History and Institutions	2	------	22	39
Day	10. History of Greece; political, with especial reference to economic and constitutional	4	------	------	25
Day	11. History of Rome; political, with especial reference to economic and constitutional	4	------	------	16
Plehn	12. Economic History	4	------	49	35
Plehn	13. Local Government and Administration; comparative study, etc.	4	------	------	39
Plehn	14. Finance and Taxation	4	------	24	41
Moses	15. Economic Theory	4	------	40	15
Moses	16. History of Political Theories	4	------	23	14
Moses Moses	17. 22. Political Science	2	------	5	11
Haynes	18. Social Conditions	4	------	16	------
Moses	18. Theories of Social Progress	2	------	------	2
Bacon	21. The History of the Christian Church	2	------	------	4
Plehn	22. Statistics; History, Theory, and Methods	2	------	------	10
	SEMITIC LANGUAGES.				
Voorsanger	1. Hebrew. Elementary	------	2	7	9
Voorsanger	2. Hebrew. Advanced Course	------	2	—	2
Voorsanger	3. Aramaic. Introductory Course	1	------	------	------
	CLASSICAL PHILOLOGY.				
Flagg	1. Introductory Course	1	------	53	------
Flagg	2. Studies in Greek History	------	1	17	------
Flagg	3. Studies in Roman History	------	1	------	33
G. M. Richardson	4. Classical Archæology, I. The Private Life of the Ancient Greeks	------	2	------	5
G. M. Richardson	5. The Private Life of the Ancient Romans	2	------	3	------
G. M. Richardson	5. Classical Archæology, II. Introduction to Greek Sculpture	2	------	------	5
G. M. Richardson	8. Classical Archæology, V. Topography and Monuments of Ancient Rome	2	------	------	9
	GREEK.				
Flagg	1. Twelve books of Homer	3	------	53	44
Clapp	2. Two books of Herodotus	3	------	40	------
Clapp	2. Herodotus and Plato's Apology	3	------	40	40
Clapp	3. Plato and Greek Composition	1	------	25	14
Clapp	4. Introduction to Greek Tragedy	3	------	22	27
Clapp	5. The Greek Drama: Continued	3	------	20	25
Flagg	6. The Sixth and Seventh Books of Thucydides	2	------	6	------
G. M. Richardson	6. The Protagoras of Plato	1	------	------	13
G. M. Richardson	7. The Greek Lyric Poets	1	------	------	6
Clapp	8. Sophocles and Euripides	2	------	9	------
G. M. Richardson	10. Theocritus. (*See Course 20, Latin.*)				

ENROLLMENT IN THE COURSES OF INSTRUCTION—Continued.

Instructor.	Title of Course.	No. of Hours a Week.		No. of Students in Attendance.	
		One Term	Two Terms	1894–95	1895–96
Flagg	10. Selections from the Attic Orators	2	-----	-----	8
Clapp	11. Greek Testament; a purely Philological Study, etc.	2	-----	8	-----
Clapp	11. Sophocles	2	-----	-----	10
Clapp	12. Demosthenes	2	-----	-----	10
Flagg	13. Æschylus	2	-----	-----	10
	19. Theocritus. (*See Course 32, in Latin.*)				
Clapp	22. Greek Seminary: philological investigation	-----	3	10	-----
Clapp; Flagg	23. Readings from Greek authors	-----	-----	——	——
Clapp	30. The Republic of Plato	-----	4	-----	8
Flagg	31. Sophocles. Plays and Fragments	-----	-----	——	——
Clapp	34. Greek Seminary	-----	-----	——	-----
	LATIN.				
L. J. Richardson	1. Cicero and Nepos	3	-----	102	-----
Price; Pitcher	1. Cicero. Roman Life from the Sources	3	-----	-----	117
Flagg; L. J. Richardson	2. Quintus Curtius; Plautus and Terence	3	-----	80	-----
Price; Pitcher	2. Plautus and Terence	3	-----	-----	100
L. J. Richardson	3. Livy and Latin Composition	-----	1	61	-----
Price; Pitcher	3. Latin Composition, I; prose writing based on Cicero and Livy	-----	1	-----	109
Flagg; L. J. Richardson	4. The Odes and Epodes of Horace	3	-----	51	-----
Merrill; Graves	4. Latin Composition, II; writing Latin in the style of Cicero	-----	1	-----	45
L. J. Richardson	5. Selected Letters of Cicero and Pliny	3	-----	36	-----
Flagg; Price	5. Horace. The Odes and Epodes	2	-----	-----	68
Merrill	6. Latin Composition	-----	1	10	-----
G. M. Richardson	7. The Pharsalia of Lucan	1	-----	8	41
G. M. Richardson	8. The Fasti of Ovid; Roman Mythology	2	-----	9	-----
Price	8. Selected Letters of Cicero and Pliny	2	-----	-----	41
Merrill	9. Catullus. Ovid, Amores, at sight	2	-----	-----	45
Merrill	10. The Epistles of Horace	2	-----	7	-----
G. M. Richardson	11. Moral Essays of Seneca	1	-----	3	-----
Flagg	12. Latin Composition, III. Extended idiom; translation of English masterpieces	-----	1	-----	6
G. M. Richardson	13. Georgics of Virgil	1	-----	2	-----
G. M. Richardson	13. Latin Composition, IV. Continuation of Course 12	-----	1	-----	4
G. M. Richardson	14. The Pharsalia of Lucan; lectures, with translation and exegesis	1	-----	-----	5
Merrill	15. The Annals of Tacitus	2	-----	——	-----
Merrill	16. Patristic Latin. Tertullian and the Hymn Writers	2	-----	10	-----
G. M. Richardson	17. Advanced Latin Composition	-----	1	13	-----
Flagg	18. Lucretius and Virgil	2	-----	——	-----
Merrill	18. Tacitus, Histories. Suetonius	2	-----	-----	30
Merrill	19. Patristic Latin. Augustine and the Hymn Writers	3	-----	-----	17
G. M. Richardson	20. Greek and Roman Bucolic Poetry	3	-----	2	-----
G. M. Richardson	21. Roman Satire	3	-----	1	-----
Merrill	23. Latin Seminary	-----	3	3	-----
Merrill	24. Early Latin	2	-----	24	-----
Merrill	24. Early Latin	3	-----	-----	19
G. M. Richardson	31. Roman Satire	3	-----	-----	3
Merrill	34. Latin Seminary	-----	3	-----	6
Merrill	35. Teachers' Training Course	2	-----	-----	4
Flagg	40. Readings from Latin Authors	-----	-----	——	——

ENROLLMENT IN THE COURSES OF INSTRUCTION—Continued.

Instructor.	Title of Course.	No. of Hours a Week.		No. of Students in Attendance.	
		One Term	Two Terms	1894–95	1895–96
	ENGLISH.				
Lange; Armes; Syle; Sanford; McGilvary	1. (*a*) Types of English Prose Style		4	382	
Armes; Syle; Sanford; McGilvary	(*b*) Supplementary Reading		1	368	
Armes; Syle; Sanford; Hart	1. Types of English Prose Style		3		397
Armes	2. Practical Rhetoric	3		29	
Bradley; Armes	2. General History of English Literature; synoptical view		3		174
Armes	3. English Masterpieces	3		38	
Syle	3. Composition and Reading		2		43
Bradley	4. General History of English Literature		3	95	
Sanford	4. Short Course in the History of English Literature		2		30
Gayley	5. Argumentation	2		16	
Lange; Hart	5. (*a*) Elementary Old English		2		72
Lange	6. Exposition	2		34	43
Gayley	7. Forensics. Practice in debate, etc.	2		9	
Gayley	7A. Argumentation. Analysis of Masterpieces, etc.	3			19
Gayley	7B. Forensics. Practice in debate, etc.	2			12
Gayley; Lange	8. Poetics. A topical survey	2		40	60
Gayley	9. Problems of Literary Criticism. Seminary and lectures	3		33	41
Lange	10. (*a*) Old English. Elements of grammar; translation of prose	2		18	
Lange	(*b*) Germanic Sources of English Life and Culture	1		25	
Bradley	10. Frequent and Rapid Writing. Advanced course involving personal training		2		
Lange	11. (*a*) Old English Poetry				
Lange	(*b*) Introduction to Germanic Philology. Lectures	3		13	
Bradley	12. The English Language and Grammar	3		16	
Lange	12. Advanced Old English	2		8	8
Lange	13. Chaucer. A minute study, etc. Seminary	2		9	6
Bradley	14. English Grammar	2			10
Sanford	15. Spenser and the Spenserians	2		5	17
Armes	16. History of the Drama—				
	(*a*) Introduction to the English Drama	2		31	25
	(*b*) The History of the English Drama	2		16	23
Gayley	17. Shakespeare—				
	(*a*) General Criticism of Twelve Plays	2		36	38
	(*b*) The Construction of Shakesperian Comedy	2		18	17
Bradley	18. Milton	2		13	16
Syle	19. English Literature of the Eighteenth Century—				
	(*a*) Restoration Comedy, etc.	2		12	22
	(*b*) The Novelists, the Historians, etc.	2		10	21
Sanford	20. English Romanticism	2		11	14
Gayley	22. Browning	2		18	
Gayley	22. Tennyson and Browning	3			28
Gayley	23. English Comedy	2		18	
Bradley	23. Study of an Author. Entire production of some selected author, etc.	2		2	2

Enrollment in the Courses of Instruction—Continued.

Instructor.	Title of Course.	No. of Hours a Week.		No. of Students in Attendance.	
		One Term	Two Terms	1894–95	1895–96
Bradley	24. The Essay	------	2	5	11
Lange	24. Old Icelandic	------	2	------	1
Lange	25. English Philology. Old Icelandic	2	------	3	------
Lange	25. Phonology. First Modern English	------	2	------	1
Gayley	30. The History of Æsthetic Theory. Seminary— (b) The Middle Ages, the Renaissance and Modern Æsthetics	------	2	17	------
	(c) The Æsthetic bases of English Criticism in the Nineteenth Century, etc.	------	2	------	9
------	31. Special Study	------	------	------	------
Gayley	31. English Comedy—Investigation	------	2	------	2
	GERMAN.				
Putzker; Senger	1. Introductory Course	------	4	119	169
Lange	1A. German Prose	------	4	------	33
Putzker	2. Schiller	------	4	82	91
Senger	3. Scientific German	------	3	13	11
Senger	4. Goethe	------	3	26	46
Putzker	5. Lessing	------	3	15	17
Senger	6. Composition and Conversation	------	2	4	8
Senger	7. Middle High German and Old High German	------	------	2	17
Senger	8. Gothic	2	------	3	4
Putzker	9. German Literature. Graduate Course	------	2½	------	------
Putzker	10. German Lyric Poets of the Nineteenth Century	------	3	------	11
Senger	12. Historical German Grammar	2	------	------	4
Ongerth	German Colloquia	------	------	——	——
	ROMANCE LANGUAGES.				
Paget; Howard; Faucheux	1. Introductory Course. French Grammar and Reader	------	4	169	175
Paget; Faucheux	2. Le Roi des Montagnes	------	2	148	------
Faucheux	2. Scientific and Literary French Prose	------	2	------	49
Howard; Faucheux	3. Grammar and Prose	------	3	21	------
Howard; Faucheux	3. Prosper Mérimée's Colomba	------	1	------	130
Paget; Faucheux	4. Le Trois Mousquetaires	------	1	73	------
Paget	4. French Drama	------	2	------	124
Paget; Huntington	5. French Drama	------	2	73	------
Howard	5. French Composition	------	1	25	16
Faucheux	6. Selections from the Poets of the Romantic School	------	2	------	26
Paget	7. Victor Hugo's Prose	------	2	40	------
Faucheux	7. An Elementary Course in the History of French Literature	------	2	------	10
Faucheux	8. Lamartine's Poetry	------	2	13	------
Huntington	9. General Survey of French Literature	------	2	21	------
Paget	12. Literature of the Eighteenth century. Lectures	------	1	------	43
Paget	13. Literature of the second half of the Seventeenth century. Lectures	------	1	28	------
Paget	13. Victor Hugo's Prose	------	2	------	56
Faucheux; Huntington	14. Victor Hugo's Poetry	------	2	15	13
Paget	15. The Romantic School. Lectures	------	1	------	23
Paget	18. Poets and Novelists of the Nineteenth Century. Lectures	------	1	18	------
Howard	18. Grammar. Selections from Gil Blas, etc.	------	3	------	34

ENROLLMENT IN THE COURSES OF INSTRUCTION—Continued.

Instructor.	Title of Course.	No. of Hours a Week.		No. of Students in Attendance.	
		One Term	Two Terms	1894–95	1895–96
Howard	19. Grammar and Selections from Gil Blas	3	------	21	------
Howard	19. Spanish Drama	------	3	------	15
Howard	20. Modern Spanish Novels	3	------	16	------
Paget	20. Don Quijote; critical reading	-----	1	------	14
Huntington	21. Don Quijote	------	3	8	------
Howard; Huntington	21. Grammar and Modern Italian	------	3	3	5
Paget	23. Dante's La Divina Commedia	------	2	1	------
Paget	24. Dante's La Divina Commedia. Purgatoris	------	2	------	5
Faucheux	25. Old French	------	2	-----	6
Paget	26. Comparative Syntax and Study of Old Texts continued	------	2	3	------
Paget	26. A Comparative Study of the principal romance languages (*a*) Phonetics. (*b*) Morphology. (*c*) Comparative Syntax.	------	2	------	7
	DECORATIVE AND INDUSTRIAL ART.				
Ardley; Maybeck	1. Elementary Drawing	------	2	135	74
Ardley; Maybeck	2. Advanced Drawing—Study of the Antique in Crayon, Charcoal, etc.	------	2	30	29
Ardley; Maybeck	4. Ornamental Design	------	4	------	18
Ardley	5. Original Analysis	2	------	------	3
Ardley	6. Ancient Art and Historic Ornament	2	------	------	4
	MATHEMATICS.				
Stringham; Edwards; Haskell; Hengstler; Pierce; Wright	1. Algebra. The later chapters in elementary algebra	------	2	234	376
Stringham	2. The Language and Methods of Mathematics	------	2	------	48
Edwards; Haskell; Pierce; Wright; Saph	3. Elements of Analysis	------	5	79	138
Haskell; Wright; Saph; Edwards; Hengstler; Pierce; Saph	4. Plane Trigonometry	3	------	73	87
Haskell; Hengstler; Edwards	5. Plane and Analytic Geometry	3	------	82	95
Edwards; Pierce	6. Solid and Spherical Geometry. The Fundamental Propositions, etc.	2	------	150	102
Pierce	7. Spherical Trigonometry	1	------	31	41
Stringham; Haskell; Hengstler	9. Differential and Integral Calculus	------	3	48	108
Edwards	10. Problems in the Differential and and Integral Calculus	2	------	3	35
Haskell	11. Determinants and Theory of Equations	3	------	1	------
Haskell	12. Projective Geometry	3	------	4	------
Hengstler	12. Propædeutic to the Higher Analysis	------	2	27	5
Pierce	13. Conic Sections, Advanced Course	------	3	5	------
Edwards	13. Principles and Methods of Instruction	------	1	32	40
Pierce	15. Analytic Projective Geometry	------	3	------	7
Hengstler	17. History of Mathematics	------	2	12	10
Stringham	18. Logic of Mathematics	2	------	6	10
Edwards	19. Differential Equations	------	3	28	25
Stringham	21. Theory of Functions of Real Variables	------	2	10	5
Haskell	22. Theory of Functions of a Complex Variable	3	------	------	8

ENROLLMENT IN THE COURSES OF INSTRUCTION—Continued.

Instructor.	Title of Course.	No. of Hours a Week.		No. of Students in Attendance.	
		One Term	Two Terms	1894–95	1895–96
Haskell	23. Theory of Algebraic Forms	4	......	3	......
Haskell	24. Higher Plane Curves	4	......	3	......
Pierce	26. Quaternions; elementary presentation of the principles	......	3	1	......
Stringham	27. Absolute Geometry (Given in connection with course 34.)	......	2	6	......
Haskell	30. Theory of Numbers	4	......	1	......
Haskell	31. Theory of Substitutions	......	2	......	4
Stringham	32. Partial Differential Equations	3	......	......	9
Stringham	34. Mathematical Seminary	......	......	......	——
	PHYSICS.				
Whiting; Sones	1. Elementary Physics; lectures and laboratory	3	......	192	......
Lewis; Alexander	1. Elementary Physics; lectures and laboratory	......	3	......	155
Whiting; Sones	2. Elementary Physics; continuation of Course 1	3	......	157	......
Lewis	2. General Physics; lectures with experimental illustration	......	3	......	107
Whiting	3. General Physics; lectures with experimental illustration	3	......	75	......
Drew	3. Physical Measurement; laboratory	......	2	......	90
Whiting	4. General Physics; continuation of Course 3	3	......	52	......
Slate	5. General Physics; lectures with experimental illustration	......	3	26	......
Slate; Raymond	5. Analytic Mechanics; lectures	......	4	......	40
Drew	6. Physical Measurement; laboratory—				
	(*a*) Measurements in Mechanics, Heat, Light, etc.	1½	......	40	......
	(*b*) Measurements in Chemical Physics	1½	......	12	......
	(*c*) Measurements supplementary to (*a*)	1½	......	12	......
Raymond	6. Harmonic Motion	2	......	......	2
Slate; Raymond	7. Analytic Mechanics; lectures	......	4	44	......
Raymond	7. Absolute Electrical Measurements; lectures and laboratory	3	......	......	21
Raymond	8. Harmonic Motion	2	......	3	......
Lewis	8. Spectroscopy; lectures	2	......	......	8
Raymond	9. Absolute Electrical Measurements; lectures and laboratory	3	......	17	......
Drew	9. Light. Special reference to optical instruments; lectures	2	......	4	4
Raymond	12. Electricity. Elementary theory	2	......	2	......
Drew	12. Heat as a Form of Energy—Experimental lectures	2	......	......	2
Raymond	14. Advanced Physical Measurement	3	......	......	7
Raymond	15. Physical Optics; laboratory	2	......	3	......
Slate	15. Dynamics of Rotation	......	2	......	7
Raymond	16. Advanced Physical Measurement	3	......	12	......
Raymond	17. Special Advanced Study and Research; laboratory	......	......	——	......
	17. (*a*) Recent Advances in the theory of Electrolysis	......	2	......	1
	(*b*) Stresses and Strains in Elastic Solids	......	2	......	2
late	18. Readings and Discussions	......	4	2	......

ENROLLMENT IN THE COURSES OF INSTRUCTION—Continued.

Instructor.	Title of Course.	No. of Hours a Week.		No. of Students in Attendance.	
		One Term	Two Terms	1894–95	1895–96
	ASTRONOMY.				
Leuschner	1. Modern Astronomy. An introductory course	3	......	14	......
Leuschner	1. Modern Astronomy—				
	(*a*) An introductory course	2	......	......	23
	(*b*) Progress in Astronomy through modern methods	2	......	......	27
Leuschner; Seares	2. Supplement to Course 1. Practice in observing	......	2	13	9
Leuschner	3. General Astronomy	3	......	......	12
Leuschner; Seares	4. Practical Astronomy and Navigation; continuation of course 3—				
	(*a*) Astronomy	3	......	5	12
	(*b*) Practical work in observatory	......	2	6	5
Leuschner	6. Theoretical Astronomy	......	4	4	3
Leuschner	7. Method of Least Squares	2	......	18	......
Leuschner	10. Summer School; continuation of Course 3	......	......	——	——
Leuschner	11. Advanced Practical Astronomy	......	1	......	6
Leuschner	12. Higher Theoretical Astronomy	......	2	......	4
	CHEMISTRY.				
Rising	1. Inorganic Chemistry: The non-metals	3	......	218	163
Rising	2. Inorganic Chemistry: The metals	2	......	188	......
Rising	2. Inorganic Chemistry: The metals	3	......	......	149
Sharwood; Lenher	3. Laboratory: Experiments	2	......	120	137
Sharwood; Lenher	4. Laboratory: Qualitative Analysis	2	......	120	120
Rising; Lenher; O'Neill; Blasdale	5. Laboratory: Quantitative Analysis. Gravimetric	3	......	21	41
Rising; O'Neill; Blasdale	6. Laboratory: Quantitative Analysis. Volumetric	3	......	20	43
O'Neill	7. Organic Chemistry	4	......	13	......
Rising	7. Inorganic Chemistry	2	......	......	18
O'Neill; Norris	8. Laboratory: Organic Chemistry. Supplementary to Course 7	4	......	18	......
O'Neill	8. Organic Chemistry. Elementary introductory course	2	......	......	23
Rising	9. Theoretical Chemistry	......	2	9	......
O'Neill	9. Organic Chemistry. Advanced	3	......	......	13
Rising; O'Neill	10. Advanced Laboratory	4,5,6	......	9	......
O'Neill; Norris	10. Laboratory: Organic. Supplementary to Courses 8 and 9	3	......	......	8
Rising	11. Theoretical Chemistry	3	......	......	8
Rising	11A. Theoretical Chemistry	......	2	......	14
O'Neill	16. Physiological Chemistry	2	......	1	......
Blasdale	16. Ore Analysis	2	......	......	9
O'Neill	17. Toxicology; lectures and laboratory	2	......	13	......
Rising; Lenher	17. Analysis of Iron, Steel, and Alloys	1	......	2	2
O'Neill	18. Physiological Chemistry Lectures	2	......	......	17
O'Neill; Blasdale	19. Water Analysis	1	......	21	......
O'Neill	19. Laboratory. Urine Analysis, etc.	1	......	......	11
O'Neill	21. History of Chemistry	1	......	7	......
O'Neill; Blasdale	21. Water Analysis	1	......	......	9
O'Neill	24. Selected Topics in Organic Chemistry	1	......	......	11
Rising	25. Explosives	2	......	......	9
Sharwood	26. Rare Metals; lectures and discussions	1	......	......	2
Sharwood	27. Chemistry of Pure Metals	1	......	6	......
Rising	28. Teachers' Course	4	......	......	3

ENROLLMENT IN THE COURSES OF INSTRUCTION—Continued.

Instructor.	Title of Course.	No. of Hours a Week.		No. of Students in Attendance.	
		One Term	Two Terms	1894–95	1895–96
	BOTANY.				
Howe	1. Vegetal Structure and Morphology	3	------	61	81
Greene	2. Systematic and Economic Botany	3	------	41	------
Jepson	2. General Plant Morphology	3	------	------	53
Greene; Jepson	3. Advanced Systematic Botany	------	3	8	------
Jepson	3. Systematic Studies among the Angiosperms	3	------	------	6
Greene; Jepson	4. Medical Botany	------	3	4	------
Howe	5. Cryptogamic Botany	------	3	10	9
Howe	6. Vegetable Histology	2	------	7	------
Setchell; Howe	6. Vegetable Histology	3	------	------	8
Greene	7. The Phanerogamic Natural Orders	------	3	1	2
Davy	7A. Economic (Agricultural and Commercial) Botany	2	------	8	------
Greene	8. History of Botany	——	——	3	------
Davy	8. Economic Botany (Agricultural, Commercial, and Medical)	2	------	------	7
Greene	9. Graduate	——	——	1	------
Howe	9. Systematic Critical Studies in Cryptogamous Plants	------	2	------	4
Setchell	10. Vegetable Cytology and Microtechnique	3	------	------	4
Greene	11. History of Botany	------	------	------	2
	ZOÖLOGY.				
Le Conte	1. Comparative Zoölogy	------	2	135	220
Johnson; Holmes	2. Morphology of Invertebrates	3	------	24	------
Ritter; Torrey	2. Morphology of Invertebrates	4	------	------	34
Johnson; Holmes	3. Morphology of Lower Vertebrates	3	------	24	------
Johnson	3. Morphology of the Lower Vertebrates	4	------	------	33
------	4. Structure and Affinities of the Mammalia	2	------	------	9
Johnson; Ritter	5. Microscopical Anatomy	5	------	13	15
Johnson	6. Embryology	5	------	10	17
Holmes; Johnson	7. Systematic Zoölogy	2	------	5	2
Johnson	8. Graduate Zoölogy	------	------	7	------
------	8. Seaside Laboratory	------	------	------	------
Ritter	12. Zoölogical Seminary	------	1	------	4
	GEOLOGY.				
Le Conte	1. General Geology	------	3	155	145
Lawson	2. Field Geology	------	2	6	5
Lawson	3. Petrography	------	1	5	6
Lawson	4. Petrographical Laboratory	------	1	5	6
Lawson	5. Graduate Course: Inorganic Geology	------	------	2	------
Merriam	5. Elementary Palæontology. Lecture and Laboratory	------	3	------	2
Merriam	6. General Palæontology	------	2	6	------
Merriam	6. Advanced Palæontology	2	------	------	5
Merriam	7. Advanced Palæontological Laboratory	------	2	------	3
Lawson	8. Graduate Course: Inorganic Geology	------	------	------	2
	MINERALOGY.				
Ransome	1. Mineralogical Laboratory	------	2⅔	32	48
Lawson	2. Crystallography—				
	(*a*) The Morphology of Minerals	2	------	6	18
	(*b*) Crystallographic Laboratory	1	------	6	16

ENROLLMENT IN THE COURSES OF INSTRUCTION—Continued.

Instructor.	Title of Course.	No. of Hours a Week.		No. of Students in Attendance.	
		One Term	Two Terms	1894–95	1895–96
Lawson	3. Descriptive Mineralogy and Mineralogical Laboratory—				
	(a) Descriptive Mineralogy	2	------	4	15
	(b) Inspection of Minerals	1	------	4	15
Lawson	4. Graduate Course	------	------	1	------
	MECHANICAL ENGINEERING.				
Slate	1. Analytic Mechanics	------	4	37	40
Hesse	2. Hydrodynamics	3	------	17	19
Hesse	3. Hydraulics and Hydraulic Machinery	3	------	8	12
Le Conte	4. Kinematics—				
	First Term	2	------	8	13
	Second Term	3	------	9	12
Hesse	5. Thermodynamics	3	------	8	10
Hesse	6. Dynamics of Heat Engines	3	------	8	12
Hesse; Cory; Le Conte	7. Mechanical Laboratory. Experimental Engineering	------	2	8	------
Chesebrough	8. Mechanical Practice	------	2	27	64
Chesebrough	9. Mechanical Practice	------	2	25	28
Cory	10. Electrical Machinery	4	------	6	------
Cory	11. Electrical Engineering—				
	(a) Alternating Currents and Alternating Current Machinery	4	------	7	------
Cory	11. Electrical Engineering—				
	(a) Alternating Currents, etc. (b) Electricity in Engineering and Principles of Electrical Installation	----	4	------	13
	(c) Electrical Laboratory and Designing	------	2	------	11
	CIVIL ENGINEERING.				
Randall; Fogg	1. (a) Surveying Lectures—				
	First term	2	------	61	79
	Second term	1	------	53	79
Randall	(b) Field Practice and Mapping	------	3	49	------
Randall; Fogg	(b) Field Practice and Mapping—				
	First Term	1	------	------	68
	Second Term	2	------	------	68
Randall	2. (a) Railway, Highway, and Canal Surveying	3	------	8	8
Randall; Fogg	(b) Railroad Field Practice and Mapping	2	------	19	14
Randall	3. Summer School in Field Practice and Mapping	------	------	17	22
Randall	4. Railroad Economics	3	------	------	9
Randall	6. Highways and Pavements	2	------	5	12
	7. Framed Structures—				
Randall	(a) Computation of stresses, etc.	3	------	12	13
Randall	(b) Swing, suspension, cantilever bridges, etc.	3	------	6	8
	8. Strength of Materials—				
Soulé	(a) Properties and Characteristics of materials used in construction	4	------	29	28
Soulé	(b) Civil Engineering Laboratory	1	------	8	3
Soulé	9. Sewer Systems	2	------	9	7
Soulé	10. Irrigation and Drainage	2	------	9	6
Soulé	11. Water Supply Systems	3	------	6	3
Soulé	12. Construction of Dams	3	------	5	5
Soulé	13. Foundations of Structures	2	------	6	8
	MINING AND METALLURGY.				
Christy	1. Lectures on Mining	4	------	6	5
Christy	2. Lectures on Mining	4	------	7	5

ENROLLMENT IN THE COURSES OF INSTRUCTION—Continued.

Instructor.	Title of Course.	No. of Hours a Week.		No. of Students in Attendance.	
		One Term	Two Terms	1894–95	1895–96
Christy	3. Mining Laboratory	2	------	3	10
Christy	4. Summer School of Practical Mining	------	------	——	——
Christy	5. Metallurgy: Structural Metals and Fuels	2	------	25	38
Christy	6. Metallurgy: General Methods of crushing ores, etc.	2	------	7	21
Christy	7. Assaying. Lectures and laboratory	------	2	9	------
Christy; Simonds	7. (*a*) Assaying. Lectures and laboratory. Gold and silver ores	2	------	------	18
Christy; Simonds	(*b*) Assaying. Lectures and laboratory. Ores of lead, antimony, tin, etc.	2	------	------	3
Christy	8. Metallurgy of Gold and Silver. Lectures	2	------	------	7
Christy; Hersam	9. Metallurgical Laboratory, supplementary to Course 8	2	------	3	4
Christy; Hersam; Simonds	10. Metallurgical Laboratory; mill work	2	------	5	6
Christy	11. Metallurgy of Lead, Copper, and Quicksilver	2	------	------	9
Christy	12. Ore Dressing	------	2	4	------
	INDUSTRIAL DRAWING AND DECORATIVE ART.				
Ardley; Maybeck	1. Elementary Drawing	2	------	135	------
Kower; Maybeck	2. Descriptive Geometry	------	4	90	------
Ardley; Maybeck	3. Topographical and Structural Drawing	1	------	26	------
Kower	4. Mechanical Drawing	2	------	28	------
Kower	5. Mechanical Drawing. Continuation of Course 4	2 2	------ ------	35 13	------ ------
Kower	6. Graphostatics	2	------	35	------
Kower	7. Construction; including designing of engineering structures— College of Civil Engineering	------	6	6	------
	College of Mechanics	------	4	8	------
Ardley	8. Drawing from casts in crayon and charcoal	------	------	——	------
Ardley	9. Brush work	------	------	——	------
Ardley	10. Architectural Free Hand Work	------	------	——	------
Ardley	11. Landscape—Outdoor work in black and white and water colors	------	------	——	------
Ardley	12. Decorative and Industrial Art	------	------	——	------
	INSTRUMENTAL DRAWING AND ENGINEERING DESIGN.				
Ardley; Maybeck	1. Instrumental Drawing	2	------	------	74
Kower; Maybeck	2. Descriptive Geometry	------	2	------	70
Fogg	3. Topographical and Structural Drawing	1	------	------	14
Kower	4 Mechanical Drawing	2	------	------	36
Kower	5. Mechanical Drawing. Contination of Course 4	2	------	------	17
Kower	6. Graphostatics	2	------	------	38
Kower	7. Construction. Designing of mechanical apparatus, etc.	2	------	------	4
Randall	8. Construction; including designing of engineering structures	------	3	------	11
	AGRICULTURE, HORTICULTURE, AND ENTOMOLOGY.				
Hilgard; Loughridge	1. General Course in Agricultural Chemistry— (*a*) Chemistry of plants, and their products, etc	3	------	12	8

ENROLLMENT IN THE COURSES OF INSTRUCTION—Continued.

Instructor.	Title of Course.	No. of Hours a Week.		No. of Students in Attendance.	
		One Term	Two Terms	1894–95	1895–96
Hilgard; Loughridge	(*b*) Chemistry and physics of soils, etc	3	------	7	8
Hayne; Colby; Bioletti	2. Vinification	2	------	———	3
Jaffa; Colby; Hayne	3. Agricultural and Viticultural Laboratory	------	8 or 10	4	8
Jaffa	3. (*a*) Analysis of Forage Plants, Hays, and Mill Stuffs	3	------	------	5
Wickson	4. General Course in Agriculture and Horticulture	------	3	7	6
Hayne	5. Viticulture; Olive Culture	2	------	7	5
Woodworth	7. Elementary and Economic Entomology	2 or 3	-- ---	9	
Woodworth	8. Apiculture. Lectures and laboratory	2 or 3	------	5	1
Woodworth	9. Parasitic Plant Diseases	2	------	5	7
Woodworth	10. Systematic Entomology	3	------	———	-----
Woodworth	11. Structural Entomology; an advanced course of lectures	3	------	4	-----
Woodworth	12. Entomological Laboratory	------	4 or 6	3	7
Wickson	13. Seminary Course in Agricultural Literature	------	1	11	13
Hilgard; Loughridge	14. Relation of Soil and Agriculture to Climatic Conditions	2	-----	------	5
	PHYSICAL CULTURE.				
Magee	1. Elementary Course; 3 half-hours, both terms	------	------	297	199
Magee	2. Advanced Course; 5 half-hours, both terms	------	------	———	------
Magee	2. Advanced Course; 3 half-hours, both terms	------	------	———	223
Magee	3. Course for Young Women; 10 hours, both terms	------	------	49	190
	MILITARY SCIENCE AND TACTICS.				
Winn	1. Practical Course. Infantry and artillery exercises, signaling, and band practice	------	2	391	552
Winn	2. Theoretical Course; lectures and recitations	------	1	72	75
	THE LIBRARY.				
Rowell	The Use of the Library: A short course of lectures at the opening of each Academic year	------	--- --	———	———

TOTAL NUMBER OF COURSES.

1894–95	295
1895–96	313

During the year 1894–95 the following University Extension Courses were given:

PEDAGOGY. The Development of Character. Six lectures, by Assistant Professor Bailey, at the Mark Hopkins Institute of Art.

HISTORY AND POLITICAL SCIENCE. Napoleon and his Epoch. Six lectures, by Associate Professor Bacon, at the Young Men's Christian Association's Auditorium, San Francisco.

HISTORY AND POLITICAL SCIENCE. Economic Questions of the Day. Twelve exercises, under the direction of Assistant Professor Plehn, at the Hall of the Starr King Fraternity, in Oakland.

HISTORY AND POLITICAL SCIENCE. Under the direction of Professor Moses, with the coöperation of the Departments of History and Political Science and Jurisprudence, the Political Science Club held fortnightly meetings throughout the first term.

GREEK. Reading and Translation of the Oedipus Tyrannus of Sophocles, with introductory matter and explanatory comment. Seven exercises, under the direction of Professor Clapp, at the Mark Hopkins Institute of Art.

LATIN. Martial; Translation and Exegesis. Six exercises, under the direction of Professor Merrill, at the Mark Hopkins Institute of Art.

ENGLISH. Poets of the Nineteenth Century. Six lectures, by Mr. Armes, at the Hall of the Ebell Society, Oakland.

GERMAN. The Classic Period of German Literature, 1748–1832. Six lectures, by Assistant Professor Senger, at the Mark Hopkins Institute of Art.

GEOLOGY. The Phenomena of Glacial Action. Three lectures, by Professor Le Conte, at the California Academy of Sciences.

GEOLOGY. The Glacial Epoch in California. Three lectures by Professor Le Conte, at the Young Men's Christian Association's Auditorium, San Francisco.

GEOLOGY. The Phenomena of Glacial Action. Three lectures, by Professor Le Conte, at the Young Men's Christian Association's Hall, Oakland.

POPULAR SCIENTIFIC LECTURES by Professor Hilgard on Drinking and Irrigating Waters of California, by Associate Professor Ardley on Decorating and Designing, by Associate Professor Bacon on the Influence of Invention upon History, by Assistant Professor Cory on Electricity, and by Professor Soulé on Engineering, were delivered at the Mechanics' Institute, San Francisco, Saturday evenings, from January 12th to April 13th.

During the year 1895–96 the following University Extension Courses were given:

PEDAGOGY. The Foundations of Pedagogical Method. Four lectures, by Assistant Professor Bailey, at the Mark Hopkins Institute of Art.

GERMAN. The Poems of Schiller. Six critical expository readings, by Professor Putzker, at the Mark Hopkins Institute of Art.

GERMAN. Goethe's Faust. Six critical expository readings, by Professor Putzker, at the Mark Hopkins Institute of Art.

DECORATIVE AND INDUSTRIAL ART. The Origin and Evolution of Art. Five illustrated lectures, by Associate Professor Ardley, at the Young Men's Christian Association's Auditorium, San Francisco.

MATHEMATICS. Some Historical Problems of Mathematics. Six lectures, by Associate Professor Haskell, at the Mark Hopkins Institute of Art.

PHYSIOLOGY. Hypnotism. Six lectures, by Professor D'Ancona, at the Auditorium of the College of Dentistry.

Under the auspices of the University, two lectures on Etching and Etchers were delivered in the Auditorium of the California Academy of Sciences, by Mr. Frederick Keppel.

The enrollment in the Summer School Courses since their organization in 1891 has been as follows:

	1891.	1892.	1893.	1894.	1895.	1896.
Chemistry	6	25	16	19	37	56
Physics	--------	15	20	--------	30	51

The following brief recapitulation of the number of students in attendance, the number of courses given, and the number of persons engaged in the work of instruction during the past five years, reveals an abnormally increasing demand on the energies of the teaching staff in Berkeley. This demand has already passed the point of safety for the best interests of the University:

	1891–92.	1892–93.	1893–94.	1894–95.	1895–96.	Approximate Increase.
Number of Students	547	650	815	1,124	1,336	144%
Graduates	37	47	64	100	118	219
Undergraduates	510	603	751	1,024	1,218	139
Number of Courses given*	158	186	225	295	313	98
Staff of Instruction	60	77	88	90	94	57%
Instructors, including Professors	46	55	58	66	70	52
Assistants	14	22	30	24	24	71

* Exclusive of University Extension Courses.

The column of percentages in this table furnishes all the comment that need be made upon this phase of our overcrowded condition. The further increase in the number of students which is already upon us (about two hundred at the present writing, September, 1896), without *any* present increase in the number of instructors, will make the work of the coming year very difficult of successful management, and will tax the resources of nearly every department to the utmost. The limit has really been reached, and the cords will snap if subjected to any greater strain.

The new grouping of studies requisite for the Bachelor's degree in the College of Letters, and in the recently organized Colleges of Social Sciences and Natural Sciences, has now been in effect for three years. This time is too short as a test of its entire efficiency for accomplishing its purpose, but at present writing every indication points to its success. As compared with our former programme it gives a larger freedom in choice of studies to the student, while, at the same time, insisting on a higher quality of scholarship, and it has greatly simplified the application of adequate criteria of fitness for graduation. The student may no longer attain to the Bachelor's degree by the accumulation of the requisite number of scholarship credits in merely elementary studies, as was sometimes possible in former years.

The present Seniors are the first class of students who began their College career under the new grouping, so that up to the present time all who have graduated since the reorganization, having first adjusted their plans to the old programme, were obliged to make many readjustments in order to conform to the new. Comparatively few completed schedules for the Bachelor's degree, therefore, exemplify in all particulars the practical working out of the new plan. In order, however, to give, as early as possible, a tangible account of how it adjusts itself to the various demands to be met, both of the student for freedom of choice and of the University for purposive study and adequate accomplishment, I present in this report four completed schedules of graduates of the present year, two for the degree of A.B., one for the degree of B.L., and one for the degree of B.S. The schedules had to be constructed in accordance with the following prescriptions:

A. Prescribed Studies. Sixty-five units,* as distributed in the following table:

Studies.	College of Letters.	College of Social Sciences.	College of Natural Sciences.
1. English	8	10	10
2. Mathematics	10	10	10
3. Natural Sciences	10	12	26
4. French or German	14	--	14
5. † Latin, French, German, History	--	28	--
6. Latin	6	--	--
7. Greek	6	--	--
8. Greek or Latin, or both languages	6	--	--
9. Military Science	5	5	5
Total hours	65	65	65

*A unit is a credit of one hour of work per week for one term (half-year).

†Not less than two nor more than three of these subjects; but the French or German, if chosen, must be pursued two years.

B. Group Electives. Thirty units of advanced studies in one subject, or not more than two cognate subjects, chosen from one of the following groups:

1. Philosophy: either alone or together with one subject from Group 2, 3, 4, 5, or 6.
2. Economics and Politics (including History and Law).
3. The Semitic, Greek, Latin, French, Spanish, Italian, German, and English languages and literatures, or any other languages and literatures that may at any time be announced among the courses of instruction; Comparative Philology, Archæology, Art, etc.
4. Pedagogy.
5. Mathematics, Physics, Chemistry, Astronomy.
6. Physics, Chemistry, Geology (including Palæontology, Mineralogy, and Petrography), the Biological Sciences (including Botany and Zoölogy).

C. Free Electives. Thirty units, chosen from the entire list of courses, subject, however, to any sequence of studies required and announced by any department.

Fifty units of the Prescribed Studies named above must be completed during the first two years; twelve units—six of a modern language and six of natural sciences—may be taken as late as the third year.

The choice of Group Electives may be announced at the beginning of any term after sixty units of work have been satisfactorily completed, but not later than the beginning of the Senior year. A statement of the courses permissible for Group Electives is made from year to year in the Announcement of Courses of Instruction.

Students who are excused from Military Service must add five to the thirty units of Free Electives.

The persons whose schedules are here presented are designated as Mr. A, Miss B, Miss C, and Mr. D.

MR. A.

COLLEGE OF LETTERS; GRADUATE OF THE YEAR 1896; DEGREE OF A.B.

Credits for Entrance Requirements on Certificate from the Lowell High School of San Francisco: Elementary English, Algebra through quadratics, Plane Geometry, Government of the United States, Cæsar's Gallic War, Cicero's Orations against Catiline, Elementary Latin Composition, Virgil's Æneid, Cicero's Orations pro Archia Poeta and pro Lege Manilia, Latin at Sight, Advanced Latin Composition, Greek Grammar, Xenophon's Anabasis, Greek at Sight, Greek Composition, Homer's Iliad, Greek History, Roman History, Solid Geometry. (The last subject in excess of the requirements.)

Prescribed Studies.		Free Electives.		Group Electives.	
English:	Units.	*Mathematics and*		*Chemistry:*	Units.
Prose Style	8	*Physics:*	Units.	Quantitative Analysis	4
		Diff. and Int. Calculus	6	Volumetric Analysis	3
Mathematics:		Analytic Mechanics	4	Organic Chemistry	4
Solid Geometry	2	Physical Laboratory	3	Organic Laboratory	3
Trigonometry	3	Physical Measurem't	4½	Explosives	2
Analytic Geometry	3	Spectroscopy	2	Water Analysis	1
Propædeutic to Anal.	3		—19½	Theoretical Chemistry	2
	—11	*Chemistry:*		Advanced Laboratory	3
One unit in excess of requirement.		Qualitative Analysis	4		—22
				Geology:	
		Mineralogy:		General Geology	6
Natural Sciences:		Crystallography	3	Field Geology	2
Inorganic Chemistry	4	Laboratory	2⅔		— 8
General Physics	6		— 5⅔		
	—10	*Greek:*			
French:		Herodotus	3		
Introductory Course	8				
	6	*English:*			
	—14	Themes	2		
Latin:					
	6				
Composition	2				
Private Life of the Romans	1				
	1				
	—10				
Greek	8				
Military Science and Tactics	5				
Total Prescribed Studies	66	Total Free Electives	34⅙	Total Group Electives	30
Total requirement for graduation	65	Total requirement for graduation	30		
In excess of requirement	1	In excess of requirem't	4⅙		

MISS B.

COLLEGE OF LETTERS; GRADUATE OF THE YEAR 1896; DEGREE OF A.B.

Credits for Entrance Requirements on Certificate from the Alameda High School: Elementary English, Algebra through quadratics, Plane Geometry, Government of the United States, Cæsar's Gallic War, Cicero's Orations against Catiline, Elementary Latin Composition, Virgil's Æneid, Cicero's Orations pro Archia Poeta and pro Lege Manilia, Latin at Sight, Advanced Latin Composition, Greek Grammar, Xenophon's Anabasis, Greek at Sight, Greek Composition, Homer's Iliad, Greek History, Roman History.

Prescribed Studies.		Free Electives.		Group Electives.	
English:	Units.	*Hebrew:*	Units.	*Latin:*	Units.
Prose Style	6	Introductory and Advanced Courses	6	Ovid	2
Themes	2	*Greek:*		Tacitus' Annals	2
	— 8	Selections	8	St. Augustine	3
Mathematics:		Composition	1	Tacitus' History	2
Algebra	3	Thucydides	2	Tibullus and Propertius	3
Trigonometry	3	Euripides	2		—12
Solid Geometry	2	Sophocles	2	*German:*	
Analytic Geometry	3	Demosthenes	2	Goethe	6
	—11		—17	Lessing	6
One unit in excess of requirement.		*Latin:*		XIXth Century Authors	6
Natural Sciences:		Composition	2		—18
Zoölogy	4	*English:*			
Geology	6	History of English Literature	6		
	—10	*Pedagogy:*			
German:		Practice of Teaching	4		
Introductory Course	8	History of Education	6		
Schiller	7	School Supervision	2		
	—15		—12		
One unit in excess of requirement.					
Latin:					
Livy	3				
Cicero and Terence	3				
Horace	3				
Pliny	3				
	—12				
Greek:					
Twelve books of Homer	3				
Tragedy and Lyric Poetry	3				
	— 6				
Total Prescribed Studies	62	Total Free Electives	43	Total Group Electives	30
Total requirement for graduation	60	Total requirement for graduation	35		
In excess of requirement	2	In excess of requirement	8		

Miss C.

College of Social Sciences; Graduate of the Year 1896; Degree of B.L.

Credits for Entrance Requirements from the Oakland High School: Elementary English, Algebra through quadratics, Plane Geometry, Geography and U. S. History, Cæsar's Gallic War, Cicero's Orations against Catiline, Elementary Latin Composition, Virgil's Æneid, Cicero's Oration pro Archia Poeta and pro Lege Manilia, Latin at Sight, Advanced Latin Composition, Greek History, Roman History, Mediæval and Modern History, Advanced English, Solid Geometry. (The last subject in excess of the requirements.)

Prescribed Studies.		Free Electives.		Group Electives.	
English:	Units.	*Philosophy:*	Units.	*Latin:*	Units.
Prose Style	8	Logic	4	Tacitus' Annals	2
Themes	2	Psychology	4	Latin Composition	2
	—10		— 8	Lucien's Pharsalia	1
Mathematics:		*Pedagogy:*		Patristic Latin	3
Algebra	3	History of Education	6	Tacitus' Histories	2
Conic Sections	3	School Systems	2	Early Latin	3
Trigonometry	3		— 8		—13
Logic of Mathematics	2	*English:*		*English:*	
	—11	History of English Literature	6	Exposition	2
One unit in excess of requirement.				Poetics	2
				Old English	5
		French:		Adv. Old English	4
Natural Sciences:		Lectures on French Literature	4	Shakespeare	2
Zoölogy	4			Literary Criticism	3
Geology	6	Victor Hugo's Prose	4	Tennyson and Browning	2
Botany	3		— 8		—20
	—13	*History:*			
One hour in excess of requirement.		European	4		
		Chemistry:			
French:		Elementary	4		
Introductory Course	8				
Le Roi des Montagnes	6				
	—14				
Latin:					
Livy	6				
Latin Composition	2				
Horace, Cicero, Pliny	6				
	—14				
Total Prescribed Studies	62	Total Free Electives	38	Total Group Electives	33
Total requirement for graduation	60	Total requirement for graduation	35	Total requirement for graduation	30
In excess of requirement	2	In excess of requirement	3	In excess of requirement	3

MR. D.

COLLEGE OF NATURAL SCIENCES; GRADUATE OF THE YEAR 1896; DEGREE OF B.S.

Credits for Entrance Requirements on Certificate from the Oakland High School: Elementary English, Algebra through quadratics, Plane Geometry, Government of the United States, Cæsar's Gallic War, Cicero's Orations against Catiline, Elementary Latin Composition, Greek History, Roman History, Physics with Laboratory, Chemistry with Laboratory, Mediæval and Modern History, Advanced English, German Grammar, Translation and Prose Composition. (Chemistry in excess of requirements, and German in lieu of Advanced Latin.)

Prescribed Studies.		Free Electives.		Group Electives.	
English:	Units.	*English:*	Units.	*Zoölogy:*	Units.
Prose Style	4	History of the Drama	2	Comparative Zoölogy	4
Practical Rhetoric	4	Germanic Sources of English Life and Culture	1	Morphology of Invertebrates	3
Summaries	1		— 3	Morphology of the Lower Vertebrates	3
Themes	4	*German:*		Microscopical Anatomy	5
	—13	Scientific German	6	Embryology	5
Three units in excess of requirement.		*Chemistry:*		Bacteriology	4
Mathematics:		Elementary Chemistry	4		— 24
Algebra	3	Analysis of Iron, Steel, and Alloys	2	*Botany:*	
Trigonometry	3	Physiological Chemistry with Laboratory	3	Morphology of the Compositæ	6
Analytic Geometry	3	Urine Analysis	2		
Solid Geometry	2		—11		
	—11	*Botany:*			
One unit in excess of requirement.		Vegetal Structure and Morphology	3		
Natural Sciences:		Systematic and Economic Botany	3		
Physics	8		— 6		
Chemistry	19				
	—27				
One unit in excess of requirement.					
French:					
Introductory Course	8				
Corneille, Racine	3				
Two dramas of Victor Hugo	3				
	—14				
Military Science and Tactics	5				
Total Prescribed Studies	70	Total Free Electives	26	Total Group Electives	30
Total requirement for graduation	65	Excess from Prescribed Studies	5		
In excess of requirement	5		31		

These four schedules have been selected as typical cases, and from them a first judgment may possibly be formed concerning the efficiency of the new grouping for its purpose, as expressed in the University Register in the following language: "This reorganization of the curriculum secures a division into general or fundamental courses on the one hand, and special or advanced courses on the other. With his entrance upon the Elective Group the student is introduced to aims and methods of study which obtain not only for higher undergraduate courses, but for graduate work. The reorganization secures, also, the regulation of the purely elective element by the restriction of at least one half of it to a group chosen in a special department of scholarship. It is believed that this adjustment of courses is preferable both to the system of rigid prescription and to that of unrestricted freedom in election, since it provides not only for liberal culture, but for concentrated and systematic study in the direction of the student's preference, and for training in methods of original investigation."

In how far is this measure filled up by good work executed in accordance with the sample schedules here presented?

The Philosophical Union has continued to hold its regular monthly meetings, supplemented by adjourned sessions and special meetings. In 1893–94 the programme of eight sessions was devoted to a discussion of Fiske's Idea of God, and of the bearing on personality, Divine and human, of its evolutional view of God as imminent in the world. These meetings excited great interest, and their topic was continued through the succeeding year 1894–95, by a discussion of the nature of God and the proofs of his existence, guided by a study of the work entitled The Religious Aspect of Philosophy, by Professor Josiah Royce, of Harvard University, a graduate of our University in the class of '75. The year was signalized by a visit of Professor Royce to the Union, in August, 1895, and his delivery before it of a public address on the Conception of God; the address was followed by critical papers, presented by Professor Sidney Mezes, of the University of Texas, a graduate of our Department of Philosophy, and later a pupil of Professor Royce; by Professor Joseph Le Conte; and by Professor Howison. The address and criticisms were published; and, besides two hundred copies distributed among the members, about six hundred were sold in various parts of the country, most of them in California. At the time of this visit, Professor Royce also addressed the Union at three special meetings, developing his views on Will as applied to an Absolute Being, and on the psychology of the individual with reference to the consciousness of self. The year 1895–96 was occupied with studies of the work by Professor John Watson, of Queen's University, Kingston, Canada, on Comte, Mill, and Spencer, and the involved critique of agnosticism. At the thirteen meetings given to this subject, papers were presented by

Professors Le Conte, Stringham, Slate, Gayley, Jones, and Howison; by Professor Griggs, of Stanford University; by Associate Professor Haskell and Assistant Professor Ritter; by Instructor McGilvary, and by Dr. Hinman, Fellow in Philosophy; and by Emmet Rixford, M.D., S. M. Augustine, Esq., and Mr. F. C. Torrey. Professor Watson himself closed the series, in May, 1896, with a course of four lectures before the Union, and by a public address on the Greek and Christian Ideals of Life. The address and two of the lectures have now been published in a volume entitled "The Christian Ideal of Life, in Its Relation to the Hebrew and Greek Ideals, and to Modern Idealism." It is hoped that these visits to the Union by its eminent corresponding members will be continued each year.

The *Longfellow Memorial Association* has just closed its thirteenth year of literary and social work. During the year 1895–96, under the presidency of Professor L. DuPont Syle, of the English Department, the following papers were presented and discussed: A Day in Florence, by Miss E. B. Packard, of the Oakland High School; Socialism, by Professor L. T. Hengstler; Heredity, by President David Starr Jordan, of Stanford University; Spain and The Spaniards To-Day, by Professor Bernard Moses; The Life and Art of Defoe, The English Comedy of Manners, The Life and Work of Swift, The Defects of Congressional Government, by Professor L. DuPont Syle.

The *Science Association of the University of California* holds general meetings about once a month, open to the public, and frequent sectional meetings under the chairmanship of the Vice-Presidents of the various sections. At present there are five sections: 1. Mathematics and Astronomy; 2. Chemistry; 3. Geology and Mineralogy; 4. Botany; 5. Zoölogy. The following topics have been presented at the general or special meetings of the association during the academic years 1894–95 and 1895–96, in the form of papers or lectures:

1894–95.

October 9—Forces which have Determined the Forms of Modern States; by Professor Bernard Moses.

October 13—The Work and Methods of the Geological Survey; by C. D. Walcott, Director of the U. S. Geological Survey.

November 7—Egyptian Art, illustrated; by Associate Professor Hy. T. Ardley.

December 4—The Basis of Scientific Philosophy; by Assistant Professor C. W. Woodworth.

January 25—The Nicaraguan Canal; by Captain W. L. Merry, Nicaraguan Consul-General at San Francisco.

February 5—What is Good Architecture; by Mr. Bernard R. Maybeck.

March 5—The Ultimate Effect of a Heat-trapping Atmosphere upon the Climate of a Planet; by Dr. Marsden Manson, of San Francisco.

April 2—Some Thoughts on the Primary Divisions of the Geological Record; by Professor Joseph Le Conte.

May 7—The Importance of the Beet-Sugar Industry for California; by Dr. Julius Koebig, of San Francisco.

1895-96.

September 20—Color Perception and Color Blindness; by Professor Joseph Le Conte.

October 4—Recent Progress in Astronomical Photography; by Professor E. E. Barnard, of the University of Chicago.

October 25—Auguste Comte, and his Influence on Modern Thought; by Professor Lester F. Ward, of the Smithsonian Institution.

November 8—Physical Features of the Hawaiian Islands; by Dr. A. B. Lyons.

December 13—Glimpses of Guatemala and Mexico, the Present and the Past; by Dr. Gustav Eisen, of the California Academy of Sciences.

February 3—Human Foods and Practical Dietetics; by Mr. M. E. Jaffa.

March 3—The Line of Investigation which has resulted in Professor Roentgen's Discovery; by Professor F. Slate.

April 3—Electric Waves, illustrated by experiments; by Mr. W. J. Raymond.

April 24—Ancient and Modern Guatemala, illustrated by stereopticon projections; by Dr. Gustav Eisen, of the California Academy of Sciences.

Farmers' Institute meetings, conducted by the College of Agriculture as a phase of University extension, are growing in public favor, and applications for the meetings exceed the ability to supply them. During the first three years after the work was begun in 1891 there were 35 institutes held, usually two days to each institute, with attendance ranging from 50 to 300 at the sessions. During the last two years 20 meetings have been held. At nearly all of them there have been two University representatives present, who have delivered stated lectures upon subjects of local importance, and the localities have furnished groups of excellent speakers upon pertinent agricultural and educational topics. In addition to the regular Farmers' Institute work, the staff of the College of Agriculture has done much in the same line, though under a different name. At Camp Roache, a summer school of agriculture in the Santa Cruz Mountains, under the auspices of the State Grange, four lecturers from the State University participated. At conventions and local meetings of fruit-growers, viticulturists, and dairymen, chiefly in the central region of the State, the staff has taken an active part, and demonstrations of College and Experiment Station work in various lines have been made.

The following lectures have been delivered by officers of the United States Army before the classes in Military Science:

January 23, 1895—The Red Cross Society, and the Care of the Wounded in Battle; by Lieut.-Col. C. R. Greenleaf, of the Medical Department, U. S. Army.

February 5, 1895—The Importance of Military Training in the United States (before entire Corps); by Lieut.-Col. J. S. Lee, of the Quartermaster's Department, U. S. Army.

March 13, 1895—Artillery; by Capt. Henry J. Reilly, Fifth Artillery, U. S. Army.

November 20, 1895—Care of the Wounded in Battle; by Lieut.-Col. C. R. Greenleaf, of the Medical Department, U. S. Army.

March 25, 1896—Artillery; by Capt. Henry J. Reilly, Fifth Artillery, U. S. Army.

April 1, 1896—Cavalry; by Capt. Alexander Rodgers, Fourth Cavalry, U. S. Army.

April 15, 1896—Seacoast Defenses; by First Lieut. Joseph E. Kuhn, of the U. S. Corps of Engineers.

Reference should be made to the experimental and observational work in Primary and Grammar School organization, supervision, and methods, that has been in progress during the past two years at the Tompkins School in Oakland, under the supervision of the Department of Pedagogy. The University owes this opportunity to the Oakland City Board of Education. Several years must elapse before definite results can be reached, but a corps of earnest teachers under the guidance of Professors Brown and Bailey are accumulating good material, out of which something of real value to education may be expected to come.

Especially worthy of note was the very creditable presentation by students on the stage, under the direction of Professor L. DuPont Syle, near the close of the last term, of Congreve's "Love for Love." Extensive modifications of the play, necessary to its proper presentation before a nineteenth century audience, were very successfully carried out by Professor Syle, and an appropriate prologue was written for it by Professor Flagg. Accounts of the preparation and the performance of the play are given in the *University of California Magazine* for May, 1896.

The *Students' Aid Society* is an organization whose object it is to assist needy and deserving students, not by gratuity of any sort, but by securing for them opportunities to help themselves. During the college years 1894–96 it has assisted nearly one hundred young men and young women to secure employment, the returns for which have aggregated $3,874 60.

The *Students' Coöperative Society* exercises the important function of supplying our classes with text-books, and the volume of its transactions has increased *pari passu*, with our increase in numbers. The statistics of sales for the past five years are as follows:

	1891–92.	1892–93.	1893–94.	1894–95.	1895–96.
Sales	$9,523 04	$12,970 93	$14,500 00	$20,000 00	$23,000 00
Number of students at Berkeley	547	650	815	1,124	1,336

The business affairs of the Association are well managed, and its financial standing is so good that it is able to command special rates from publishers.

The *University Dining Association*, organized three years ago for the purpose of providing a suitable lunching-place for students, has struggled against financial difficulty from the beginning. It has been several times saved from failure by the generosity of a few members of the Academic Council, who regard it as an important item in our University equipment.

Respectfully submitted.

IRVING STRINGHAM,
Dean.

REPORT OF THE SAN FRANCISCO ART ASSOCIATION.

(MARK HOPKINS INSTITUTE OF ART.)

San Francisco, August 20, 1896.

To the President of the University:

Dear Sir: Since my last biennial report the School of Design has established an evening class in Architectural Drawing, under the supervision of Mr. Bernard R. Maybeck, which is composed of about twenty students from offices of local architects; also, evening classes in Drawing from Life and the Antique have just been opened under the supervision of Professor John A. Stanton, and already have an attendance of forty students, largely composed of teachers in the public schools and young men from lithographic, architectural, and engineering establishments, wishing to perfect themselves in freehand drawing.

The regular day classes of the school have continued to slowly increase in number, and a marked improvement in the quality of the work performed by the students has been verified by the studies exhibited in the two annual exhibitions held since my last biennial report.

In addition to the three annual gold medals heretofore given by the school, Mr. James D. Phelan has established a medal for Modeling from Life, to be known as the Phelan Medal.

It has been decided to award a Certificate of Proficiency to such students as may pass the prescribed examinations, commencing with the present school year to the close, May 15, 1897.

Mr. Edward F. Searles's interest in the institution and school is unabated, and he has lately presented the institute with a number of valuable paintings and many choice additions to the library.

Donations of paintings have also been received from Mrs. Phebe A. Hearst; a collection of studies in oil of early California artists, from Mrs. Benjamin P. Avery; a portrait of himself, from Mr. Irving M. Scott; and gifts of photographs, sketches, studies, etc., from Mr. William Alvord, Mr. George H. Sanders, Mr. Charles R. Bishop, Mr. Rupert Schmidt, Mrs. Emma Shafter Howard, the late Mrs. M. B. M. Toland, Mr. Edward Bosqui, Mr. Alexander Oakey, and Mr. James D. Phelan; also, donations to the library from Mr. William Alvord, Mr. James D. Phelan, Mr. Henry Heyman, Mr. H. H. Moore, Mr. Samuel P. Avery, Mrs. F. F. Low, Mr. L. H. Brown, The Channing Auxiliary, and others.

At the suggestion of Mr. Edward F. Searles, the association appointed the first Friday of each month as a free day, and opened the house and exhibition free to the public on Friday, April 9th. Twenty-six hundred persons availed themselves of this opportunity to visit the institution. The following free day the attendance increased to four thousand visitors, and has been about three thousand each succeeding free day.

Mr. James D. Phelan presented the association with $1,000, to be awarded for the following purpose: $800 to be paid for the best picture painted by a California artist, resident in the State, representing one of these subjects: "The Discovery of the Pacific Ocean," by Balboa; "The Discovery of California," by Cabrillo; "The Discovery of the Bay of San Francisco," by Portola; "The Entrance of the First Vessel through the Golden Gate." The second choice in the competition shall receive $150, and the third $50. The picture receiving the first prize shall belong to the association, and all the competitive canvases shall be exhibited at the spring exhibition of the association, held April, 1896, at which time the selections shall be made by the judges.

The judges awarded the first prize to Mr. Arthur F. Mathews, the second prize to Mr. William Keith, and the third prize to Mr. Emile M. Pissis. It is to be hoped that other public-spirited citizens will follow the generous example of Mr. Phelan, and by that means assist the association in increasing and elevating the standard of art on the Golden Shore.

Respectfully submitted.

J. R. MARTIN,
Assistant Secretary.

REPORT OF THE DEAN OF THE MEDICAL DEPARTMENT.

San Francisco, August 19, 1896.

To the President of the University:

Dear Sir: I have the honor to submit to you the following report of the progress and needs of the Medical Department of the University.

In order to conform to the custom of Eastern Medical Colleges and of the academic branches of the University, the Faculty determined to abandon the plan, until recently followed, of having spring and summer sessions. The course now begins September 1st, and continues eight calendar months.

The Medical Department of the University has suffered from a weakness common to almost all American medical institutions in the insufficiency of the preliminary education of the matriculants. With the beginning of the last session applicants for admission were required to present satisfactory credentials, or pass examinations equal to those given at the close of the second year in good High Schools. After the coming session the preliminary requirements of this department will be the same as for entrance to the Colleges at Berkeley. Applicants for admission will be required to present their credentials to the regular examining board of the academic departments of the University, and, if such credentials are not satisfactory, to pass the regular examinations conducted at Berkeley.

Since my last report the course has been lengthened to four years. Graduates of recognized literary and scientific colleges, and those who spent two years in the Natural Science Course of a recognized university, are admitted to the second-year class without examination. It is to be hoped that there will soon be inaugurated a plan whereby a student taking three courses of specially prescribed studies at Berkeley and three at this department may, at the end of his six years of study, receive the two degrees of Bachelor of Science and Doctor of Medicine.

The improvements made by the Faculty have been accomplished in the face of serious disadvantages. The building now occupied, the gift of the late Dr. H. H. Toland, has become unfit for the teaching of medicine in its modern form. The Faculty feels that a new era of prosperity will begin with the completion of the building for which the Legislature, at its last session, generously appropriated $250,000 for the professional departments of the University. It can hardly be doubted that the establishment of such an institution will exert an influence upon the *esprit de corps* of the whole University that cannot be overestimated.

The Faculty earnestly hopes that the Board of Regents will appreciate the efforts to raise the standard of medical education, and devise some means by which the Faculty may be given some source of revenue with which to meet the expenses of the institution besides the fees paid by students.

Respectfully submitted.

R. A. McLEAN,
Dean of Medical Faculty.

REPORT OF THE SECRETARY OF THE POST-GRADUATE MEDICAL DEPARTMENT.

(SAN FRANCISCO POLYCLINIC.)

San Francisco, August 21, 1896.

To the President of the University:

Dear Sir: The San Francisco Polyclinic, as the Post-Graduate Medical Department of the University of California, has been, during the present year, more successful in attracting students than in the past. While, in 1895, only six graduates in medicine availed themselves of the opportunities for study, supplied by the abundant material of this institution, fifteen students have been enrolled between the first of January and the first of August, 1896. Most of these come from remote places, the majority from the State of Oregon; California furnished only four, all of them residents of San Francisco.

It was decided in the beginning of the year to arrange special courses, the subjects, time, and terms of which were to be announced beforehand, in the hope of forming classes and systematizing and concentrating the instruction more than previously, by attracting simultaneously a number of those interested in the same branches. Accordingly, last January, two thousand circulars were issued and distributed among the physicians on this coast, informing them of the intention to give a course on Gynecology. Although this effort was not unsuccessful, yet it was recognized that there were not sufficient applicants to encourage us in adopting this as the sole method of announcing and prosecuting our didactic work; and we have continued the system of individual instruction whenever required, with the intention of offering courses for classes from time to time.

The Trustees of the Polyclinic persevere in their endeavors to complete the equipment of the Bacteriological Laboratory. They have secured in Dr. Charlotte B. Spring an eminently capable Demonstrator of Bacteriology, whose meritorious work has already been appreciated by local practitioners and students from other States.

Respectfully submitted.

LEO NEWMARK,
Secretary Board of Trustees San Francisco Polyclinic.

REPORT OF THE DEAN OF THE COLLEGE OF DENTISTRY.

San Francisco, August 19, 1896.

To the President of the University:

Dear Sir: I have the honor of making the following report of the condition of the College of Dentistry of the University of California. Since the last biennial report the College has reached the maximum of attendance, being nearly double that previously reported.

The advanced standard of entrance requirements seems to be no barrier, but on the contrary, brings us better material, a large percentage of those applying last term being graduates of accredited schools.

The curriculum of the school is a graded one, covering three years of nine months.

We have strengthened the curriculum each year, particularly in the Manual Training Department.

Technic teaching is now the essential feature of a Dental College course. Many original methods have been developed in our own department.

We have in every way outgrown the accommodations afforded us in the building now occupied, and anticipate with pleasure the promised completion of our new building on the "Sutro site."

With increased facilities and better accommodations, we can easily take and maintain first rank.

Out of the thirty-eight schools forming the National Association of Dental Faculties, the College of Dentistry of the University of California ranks second in point of entrance requirements and curriculum. There are but three other schools in the country that have the same length of term; the remainder of the schools forming the association have terms of six months only.

We have every reason to be satisfied with results, as our graduates take rank with the best wherever they go.

Respectfully submitted.

LUIS LANE DUNBAR,
Dean.

REPORT OF THE DEAN OF THE COLLEGE OF PHARMACY.

San Francisco, August 18, 1896.

To the President of the University:

Dear Sir: The condition of the Department of Pharmacy during the year 1895 did not differ materially from that of the previous year, as shown in the last report. The total number of students was 114. Of these, 39 were in the Senior Class and 75 in the Junior. The result of the final examinations (at the close of the term) shows that the difference in the number in the Senior and Junior Classes remains about the same. This is due to the fact that some who enter never complete the work of the Junior course, either from having lost the student habit, or from discouragement at the poor prospects of pharmacy in a financial way in the event of success, or from other causes. Of the 75 Senior students, 26 were graduated (receiving the degree of Graduate in Pharmacy).

It is gratifying to find that the raising of the entrance requirements did not greatly reduce the number seeking admission to this department. It is probable that the more stringent final examinations, that reduce the number of Seniors recommended for graduation, and of Juniors promoted to the Senior class, have somewhat affected the attendance at the session of 1896. But the Faculty and Trustees believe that in another year or two persons contemplating the study of Pharmacy will take these things into consideration, and adjust themselves to the advanced standards now set.

Respectfully submitted.

W. M. SEARBY,
Dean.

PUBLISHED WRITINGS OF MEMBERS OF THE FACULTY.

R. G. AITKEN, A.M.,

Assistant Astronomer (L.O.).

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HENRY T. ARDLEY, S.A.,

Associate Professor of Decorative and Industrial Art.

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KENDRIC CHARLES BABCOCK, Ph.D.,

Instructor in History.

The Scandinavians in the Northwest. *The Forum*, September, 1892.
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THOS. P. BAILEY, Jr., Ph.D.,

Assistant Professor of Pedagogy.

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The Tompkins school. *Pacific Educational Journal*, 1895.

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Teachers' notes. *Normal Exponent* (Los Angeles), 1896.

Adolescence. *Proceedings Southern California Teachers' Association*, March, 1896.

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Articles on child-study, I and II. *Overland Monthly* (School Edition), September and October, 1896.

R. E. BARNARD, A.M., Sc.D.,

Astronomer (L. O.).

Observations of the partial eclipse of the Moon, September 14, 1894. *Astronomy and Astro-Physics.*

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G. M. STRATTON, Ph.D.,

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IRVING STRINGHAM, Ph.D.,

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Assistant Professor of English Literature.

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JOHN M. WILLIAMSON, M.D.,

Professor of Anatomy.

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FINANCIAL STATEMENT.

NOTE.—The Act of the Legislature of the State of California, entitled "An Act to provide for the permanent support and improvement of the University of California by the levy of a rate of taxation and the creation of a fund therefor," approved February 14, 1887, contains the following provision:

Section 5. The money derived from said fund must be applied only to the support and permanent improvement of the University, and the Board of Regents must include in its biennial report to the Governor a statement of the manner and for what purposes the money was expended.

The following statement shows in outline the manner and purposes of the expenditures of the State University Fund for the fiscal years 1894–95 and 1895–96. Statements showing these expenditures in detail are given in the Annual Report of the Secretary of the Board of Regents for the years mentioned, copies of which are sent herewith:

	1894–95.	1895–96.
RECEIPTS.		
Cash on Controller's warrants	$119,824 73	$112,543 56
EXPENDITURES.		
To Department of Lick Observatory	$20,980 26	$20,408 91
To Department of Mineralogy	496 99	692 94
To Department of Botany	543 30	388 07
To Department of Biology	459 85	
To Department of Physics	940 03	967 33
To Department of Physical Culture	249 62	3,693 05
To Department of Military Science	305 37	
To Department of Latin	49 71	
To Department of Natural Science	12,767 79	5,400 00
To College of Chemistry	17,616 94	
To College of Civil Engineering	4,978 71	
To Museum	2,998 85	1,290 61
To Library	3,550 88	5,578 34
To University Site Improvements	4,287 69	5,071 04
To University Printing Office	2,054 89	2,159 43
To fuel	1,527 56	1,456 39
To equipment	2,082 63	1,714 64
To repairs	2,438 43	1,373 02
To advertising and printing	197 40	134 45
To telegraphing and expressage	605 72	594 70
To printing monographs	206 05	
To stationery	241 73	259 25
To college celebrations	366 00	318 50
To postage	497 00	603 00
To official and lecturing expenses	4,326 05	1,616 70
To water	3,226 09	6,672 37
To permanent improvements	31,829 19	
To College of Letters		25,687 72
To College of Social Sciences		23,908 81
To Propagating House		2,355 04
To insurance		162 25
To publications		37 00
Totals	$119,824 73	$112,543 56

With the compliments of

PRESIDENT KELLOGG.

UNIVERSITY OF CALIFORNIA

BIENNIAL REPORT

OF THE

PRESIDENT OF THE UNIVERSITY

ON BEHALF OF THE BOARD OF REGENTS

TO HIS EXCELLENCY THE GOVERNOR OF THE STATE

1896-1898

BERKELEY
THE UNIVERSITY PRESS
1898

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BIENNIAL REPORT

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TO HIS EXCELLENCY THE GOVERNOR OF THE STATE

1896-1898

REPORT OF THE PRESIDENT OF THE UNIVERSITY.

University of California,
Berkeley, Cal., October 15, 1898.

To His Excellency, James H. Budd;
Governor of the State of California:

Sir:—On behalf of the Regents of the University of California, I have the honor to submit our Biennial Report for the years 1896–98.

Numbers.

These two years have been among the most eventful in the history of the University. The phenomenal increase in numbers, reported for the years preceding 1896, has been steadily maintained. The entering classes have been each considerably over 400; in 1898 larger than in 1897. The totals for the students in all departments of the University were for these years respectively 2211 and 2391; larger numbers than ever before.

Legislative Appropriation in 1896.

Two years ago the buildings at Berkeley were very greatly overcrowded. Two large tents had been put up to supplement the available spaces for instruction. A plea for relief was made to the Legislature of 1897, and in response the University was granted the income of an additional tax of one cent on a hundred dollars. The need was so urgent as to be at once appreciated, and both Houses were unanimous in affording the desired relief. That appropriation has already been of immense service. Former lines of work have been strengthened, and some new ones have been established. From the "permanent improvement" side of the new appropriation, four new wooden buildings have been erected, one of them replacing the burned Agricultural Hall. The Gymnasium has been enlarged, and other necessary improvements have been made in buildings and grounds.

New Buildings.

Hearst Architectural Plan.

At the date of our last Report, September 1, 1896, we were able to say that the Regents had taken action looking toward a new architectural plan for permanent and harmonious structures on the University's beautiful site. To secure such a plan, architects of the highest ability were to be invited to become competitors. On the 22nd of October Mrs. Phebe A. Hearst sent the following communication to the Board of Regents:

PALACE HOTEL, October 22, 1896.

Regent J. B. Reinstein,

DEAR SIR:—Referring to the conversation which I had last week with yourself and Professor Wm. Carey Jones, I desire to say that I am deeply impressed with the proposition now before the Board of Regents, to determine upon a comprehensive and permanent plan for the buildings and grounds of the University of California, on the site at Berkeley, and I heartily approve of the idea.

My son and I have desired to give some suitable memorial which shall testify to Mr. Hearst's love for and interest in this State, and after having carefully considered the matter, we feel that the best memorial would be one which would promote the higher education of its people. And I must confess that the absence of a suitable plan for the University Buildings has seemed an obstacle in the way of carrying out some ideas which we have cherished.

I feel now so imbued with the importance to the University and to the State of having such a plan, that I should be glad to aid in its complete and speedy realization. I may also say that I am the more anxious for this, as I have in contemplation the erection on the University grounds of two buildings, one of them to be the memorial referred to.

I would therefore suggest that I be permitted to contribute the funds necessary to obtain, by international competition, plans for the fitting architectural improvement of the University grounds at Berkeley. While I understand from you that such plans can be procured for about fifteen thousand ($15,000) dollars, I desire to say that the success of this enterprise shall not be hampered in any way by a money consideration.

I have only one wish in this matter—that the plans adopted should be worthy of the great University whose material home they are to provide for, that they should harmonize with, and even enhance, the beauty of the site whereon this home is to be built, and that they should redound to the glory of the State whose culture and civilization are to be nursed and developed at its University.

As the full execution of these plans will probably require a long period of time, and one of constant and assiduous attention, I should like to suggest that this trust be reposed in a special committee which will represent the several interests involved. I would name as such trustees, His Excellency James H. Budd, representing the State; Professor William Carey Jones, representing the University; and yourself, representing the Board of Regents. I have the less hesitancy in suggesting these names, as these gentlemen are all graduates of the University of California, and would, I am sure, be glad to perform this labor in gratitude to their Alma Mater. Of course the ratification of a final plan would rest with the Board of Regents.

I believe that the release of Mr. Maybeck (who has been identified with the idea of this plan from its inception) from his duties of instruction at the University, and his presence in the Eastern States and in Europe, would greatly facilitate a proper understanding of our design among architects. I would therefore further suggest that he be given a leave of absence for one or two years, and I offer to provide for him a reasonable compensation.

Yours very sincerely,

PHEBE A. HEARST.

Suitable responses (see SECRETARY'S REPORT for 1897) were made to Mrs. Hearst by Governor Budd (October 23rd) and Regent Reinstein (October 22nd); and at a meeting of the Board held October 24th, the following resolution, offered by Regent Wallace, was unanimously adopted:

Resolved, That the Regents of the University of California accept, with grateful appreciation of her kindness and forethought, the generous offer of Mrs. Phebe A. Hearst to aid the Regents in the preliminary steps to obtain a permanent and grand plan of the buildings and grounds of the University of California, and hereby respectfully invite her to act with and aid the trustees selected by her and approved by the Regents at her request for the furtherance of the purpose in hand; and the President of the University is hereby authorized to convey to Mrs. Hearst the thanks of the Board of Regents in behalf of the University.

Antwerp Award.

This plan for a world-wide competition of architects has been put into execution, and has awakened a lively interest in many countries. Over one hundred architects have entered into the competition, and September 29, 1898, was fixed for the jury's award to the most deserving. Mrs. Hearst and Regent Reinstein were at Antwerp on that date. The reduced number (eleven) of successful competitors will be granted further time to perfect their plans, after a personal inspection of the site. The final selection will probably be made in August, 1899. It may properly be added that this scheme has grown on the hands of the trustees chosen by Mrs. Hearst, and has involved a much larger outlay than was at first anticipated. But the generous patroness has cheerfully provided for all contingencies. The successful procuring of this grand plan will be a lasting monument to our noble benefactress; not to speak of the very important additional gifts foreshadowed in the letter printed above. We ought not to omit a mention of Regent Reinstein's zeal and energy in all the months required to bring this plan to a successful issue. The good work of Instructor B. R. Maybeck, in the inception and in the promotion of the plan, is recognised by all.

Buildings in Prospect.

It is a natural sequence of Mrs. Hearst's splendid example, that other wealthy citizens of the State should desire to make a place for their favorite pursuits in the contemplated new and permanent structures. Most favorable indications of such purposes are already reported. We fully believe that many fitting temples of science and learning will, as the years and decades go by, express the generous interest of Californians in their State University.

Instruction still to be Provided

Their help, however, in providing suitable buildings for the University will meet only one side of its indispensable needs. The buildings are homes for instruction; and instruction is the vital current of University life. With the growth of the classes, and the modern claim for new branches of education, more and more teachers will be needed. As the University attains a higher rank among its compeers, the instruction will demand men of the very best reputation in their departments. The State's support cannot be withdrawn; it ought rather to be gradually augmented. From time to time we hope for individual endowments, chairs like those of Tompkins and Mills; but most of the expense of instruction, literary, political, and scientific—the last especially costly—must be borne by the State, for whose sons and daughters it is provided.

Affiliated College Buildings.

The Legislature of 1895 made an appropriation of $250,000 for a group of "Affiliated College" buildings in San Francisco. Hon. Adolph Sutro gave a site for these buildings, near the entrance of Golden Gate Park, and thus became one of the conspicuous benefactors of the University. The site, containing thirteen acres, commands one of the most beautiful prospects on the whole peninsula. The buildings provided for have now received their finishing touches. The Medical Department of the University will occupy the central building on October 22nd, and Dr. Chester Rowell will give an address on behalf of the Regents. These structures are a worthy monument alike to the wisdom of the Legislature and to the generosity of Mr. Sutro. It is the concurrent testimony of experts, that scarcely any public buildings have been so economically and honestly erected. Architects, contractors, and sub-contractors have all proved faithful to their trust.

Medical Department Housed.

Last Things.

Three large buildings and a fourth smaller one are the outcome of this $250,000. It is surprising that so much could be secured for that amount. But some things remain to be done, which seem too burdensome for the young Colleges, and not properly chargeable to our general University fund. Mr. Sutro's decease has delayed the completion of necessary work on the adjacent streets. Sewerage is as yet imperfectly provided for. The large spaces of the new buildings call for more furniture and other equipment than the Colleges in their old homes possess. For such reasons it is quite important for these Colleges, and it is for the interest of the fostering

State, that a comparatively small addition to the original appropriation be granted at the coming session of the Legislature.

The Flood Gift.

On the 13th of September, 1898, the Board received through Regent Arthur Rodgers the following communication from Miss Cora Jane Flood:

San Francisco, September 13, 1898.

To the Regents of the University of California,

Gentlemen:—I hereby tender to you the following property: The Flood Residence and a tract of about five hundred and forty acres near Menlo Park, California. One-half interest in about twenty-four hundred acres of Marsh land adjacent to the Residence tract, and four-fifths of the Capital Stock of the Bear Creek Water Company which supplies water to Menlo Park and vicinity.

The only conditions I desire to accompany this gift are, that the Residence and reasonable area about it, including the present ornamental grounds, shall be kept in good order for the period of fifty years, and the net income from the property and its proceeds shall be devoted to some branch of commercial education.

Yours very truly,
Cora Jane Flood.

In response to this communication, the following resolution was offered by Regent Rodgers, and was unanimously adopted:

Resolved, That the magnificent offer of Miss Flood be accepted, and that the President of the Board and the President of the University be requested to act as a committee to convey to the donor the appreciative acknowledgments of the Board of Regents for the gift.

On motion, Regent Rodgers was added to this committee.

The Committee performed the duty assigned to them, and their letter of acknowledgment, engraved on a silver tablet, was presented to Miss Flood.

The mansion thus given to the University is one of the finest ever built on this coast, and will outlast this generation as the monument of a successful and typical pioneer, whose memory is sacred to his children. The land included in the gift is susceptible of very valuable uses for the benefit of the State. The example of such a benefaction must be most happily contagious.

The Wilmerding School.

The Wilmerding bequest spoken of in our last Report, has been carefully husbanded, and is now increased by two years' interest. Different proposals for the location of the Wilmerding Industrial School were presented, and the majority of the Board voted for San Francisco. Public-spirited citizens of that city, led by Mayor Phelan, subscribed for the purchase of a suitable site. An ample lot has been selected and deeded to the Regents, between

Fifteenth and Sixteenth Streets, and Utah and Nebraska Streets, a few blocks only from the California School of Mechanical Arts, established on the Lick foundation. It is generally understood that the new school will have less advanced courses of study than the Lick School and seek to benefit a somewhat younger class of boys.

At a meeting of the Board, November 17, 1896, Regent Phelps offered the following resolution, which was adopted by the Board:

Resolved, That in the matter of the Wilmerding School, the Board of Regents will, in accordance with the purpose of Mr. Wilmerding, establish a school wherein boys shall, as far as possible, be taught trades by practical work.

At a meeting of the Board held September 13, 1898, Mr. Everett Schwartz, of Waltham, Mass., was elected Principal of the Wilmerding School. He is expected to arrive in December, and to prepare energetically for the opening of the school in 1899. His reputation is such as to assure us an excellent beginning in the work of this important trust.

Crocker Eclipse Expedition.

The late Colonel Crocker, in sequence of several generous gifts to the Lick Observatory, promised to bear the expense of an expedition to India to observe the eclipse of January 22, 1898. His untimely death prevented his personal supervision of the business transactions, but his executors promptly carried out his oral pledges. The expedition was in charge of Professor W. W. Campbell, of Mt. Hamilton, who encountered many unexpected difficulties, but conquered them all, and was rewarded by a full series of successful observations. One lesson of the expedition is, the unwisdom of resting all the chances of success on the superintendence of a single astronomer. Professor Campbell's health proved equal to all emergencies, but it was rare good fortune that carried him safely through. The results of the expedition are not yet fully brought out, but it is known that they will be found very gratifying and important.

Other Gifts.

The minor but very useful and important gifts to the University were briefly summarized in the two Annual Statements prepared by the President to be read at our two Commencements. For the year 1896–97, the list of the chief donations ran as follows:

To the Library: From Louis Sloss, Alfred Greenebaum, ladies of Temple Emanu El, S. P. Avery, Mrs. M. A. Avery, J. K. Moffitt, Miss Rose Whiting, Miss Rose Cohn, the National Electric Light Association, J. H. Gray, Jr., and the Maharajah of Jeypore. Of a lot of land, from Miss M. Jucksch, of Berkeley. For lighting grounds, from the Berkeley Electric Lighting Company. For instruction, $500 from Hon. J. D. Phelan. Sets of rocks to Museum from Director C. D. Walcott, United States Geological Survey. From Mrs. Hearst for printing pamphlet by Miss M. W. Shinn, $300. To the Lick Observatory, from Miss C. W. Bruce, $1,000; from W. W. Law, $1,300.

For the year 1897–98, the following gifts were enumerated:

The valuable Cowan Collection of Spanish and English books, pamphlets, and manuscripts, costing $3000, from C. P. Huntington. Precious additions to the Semitic Library from Dr. Voorsanger and others. Valuable gifts to the Library from J. K. Moffitt, Louis Janin, John Swett, S. P. Avery, G. H. Mastick, Mrs. G. H. Howison, and Mrs. H. D. Palmer. Specimens for scientific collections from H. C. Callahan, J. T. Arundel, N. Baldwin. Bequest of a $7000 collection from H. W. Gould, of San Diego. From the Alaska Commercial Company a noteworthy museum of Alaskan products. Mining machinery from Fraser and Chalmers, of Chicago. Land (lease for a period of years) from James Moffitt. Mrs. Hearst's repeated gifts for needs of grounds and Library, for the equipment of the new room for the young women, and especially her provision for increasing the space and equipment of the Mining department, at a cost of over $12,000. Mention should also be made of a prize of $200, offered by Hon. George C. Perkins to the successful contestants in the intercollegiate debate with Stanford. It came our way on April 23rd, 1898.

More detailed lists of the gifts to the Library, and to the Lick Observatory, may be found in the Reports of the Secretary of the Board of Regents. Since the last Annual Statement, additional gifts have been received as follows:

From Mrs. Elise C. Hall, of Santa Barbara, a valuable medical library owned by her deceased husband, Dr. Richard J. Hall, to the Medical Department of the University. From. D. Henshaw Ward, seventy-four rare English volumes of the last century. From F. W. Dohrmann, Reports by the Italian School of Commerce at Venice. From the E. P. Allis Company, of Milwaukee, an ore-sample grinder.

Changes in the Board.

The following changes have occured in the Board of Regents during the two years:

Charles F. Crocker, Esq., died July 17, 1897. He was a valuable member of the Board, and his unexpected death was the occasion of sincere sorrow on the part of his colleagues. His gifts to the Lick Observatory are referred to above, and were most timely and helpful. He was always ready to waive pressing business interests to attend the Board's meetings, and to serve on important committees. Mrs. Phebe A. Hearst was appointed in place of Colonel Crocker.

The terms of Hon. J. West Martin and Geo. T. Marye, Jr., Esq., expired March 1, 1898. The former was reappointed, and Hon. James D. Phelan was named to succeed Mr. Marye. These several appointments will doubtless be ratified at the coming session of the Legislature.

Secretary Bonté.

The Secretary of the Board, Dr. J. H. C. Bonté, died November 24, 1896, in Sacramento, whither he had gone on furlough to recruit his failing health. He had held his office since 1881, discharging its duties with singular devotion and zeal. He took pride in the financial standing of the University, and was always ready to give an account of his official transactions, to the last cent of their multifarious items. In 1886 he was made Professor of Legal Ethics in the Hastings College of the Law.

Edward W. Davis, Esq., a graduate of the University, was elected May 11, 1897, to succeed Dr. Bonté, the duties of the office having been successfully performed in the interim by Assistant Secretary W. A. McKowen.

Faculty Changes at Berkeley.

The following changes have occurred in the teaching staff at Berkeley:

George Morey Richardson, Ph.D., Associate Professor of Classical Archaeology, died at Athens, Greece, December 11, 1896, having gone abroad for a year to prepare more fully for the duties of his new chair. He graduated at Harvard, won his doctorate in Germany, and came to us in 1888 as an Instructor in Latin. His scholarship had a rare quality of elegance, and his courtesy was unfailing. His fellow-teachers mourned the untimely cutting off of so promising a career. Like the lamented Whiting, he showed his interest in the University by a testamentary gift. Assistant Professor J. C. Rockwell came to take Dr. Richardson's place for the year.

For the year 1896–97, some other changes were as follows:

Assistant Professor Leuschner and Instructor Maybeck received leave of absence for a year; Instructor Jepson, for a half-year. Director Magee was made Assistant Professor.

The changes for the year 1897–98 were as follows:

Professors Gayley and Lawson were absent on leave for a year; Instructor Maybeck's leave was extended a year. Fractional absences on leave were those of Professor Moses and Assistant Professor Leuschner.

Lieutenant F. L. Winn completed his fourth year of detail as Commandant of the University Cadets, and Lieutenant S. A. Cloman succeeded him. Colonel C. R. Greenleaf, U. S. A., was made Honorary Professor of Military and Public Hygiene. Associate Professors Bacon and Wickson were promoted to Professorships. Assistant Professor Plehn was made Associate Professor. Instructors Hayne, Hersam, McGilvary, Sanford, and Stratton became Assistant Professors. Assistant Professors Dresslar and Margolis joined the teaching staff. Dr. A. A. D'Ancona was appointed Lecturer and Medical Examiner in Physical Culture. Dr. Gustav Gutsch was made Honorary Lecturer in Jurisprudence.

Instructor Drew went away for further study, and Instructors Leach and Richardson returned from studies abroad and at Chicago. Instructors Alexander, Flaherty, Hirst, Saph, and Wharff became such by promotion. Instructors Bakewell, Boynton, Chambers, Dickson, Noble, Nutting, Seares, and Yelland were new accessions. During the year Instructor Sharwood resigned. In the conduct of Farmers' Institutes Mr. D. T. Fowler became organizer for Northern and Middle California; Professor A. J. Cook, of Pomona College, for Southern California.

Some further changes in the teaching staff have taken place in the transition to the new college year 1898-99. Additions are: Professor Geo. Davidson, so long in charge of the United States Coast Survey on the Pacific Coast, Honorary Professors C. H. Lindley and H. Schussler; Instructors J. T. Allen, J. E. Gardner, H. M. Hopkins, R. S. Norris, T. W. Page, S. D. Townley, and E. J. Wilczynski. By promotion, Professor D'Ancona; Associate Professors Cory, Margolis, and Ritter; Assistant Professor Richardson; Instructors Torrey and Winterburn. Instructor Seares resigned. Instructor Bakewell has accepted a Professorship in Bryn Mawr College. Assistant Professor Lewis is absent on leave for the year. Assistant Professor Hayne enlisted in the army, and is now at Manila. Lieutenant Cloman was ordered to the front, and our Professor Soulé, a graduate of West Point, is now in command of the University Cadets.

Changes at Mt. Hamilton.

Important changes have taken place in the staff of astronomers at Mt. Hamilton. Dr. Edward S. Holden resigned as Director, October 12, 1897, the resignation to take effect January 1, 1898.

Dr. Holden.

Dr. Holden was the first Director of the Observatory, and came to give his assistance in carrying out Mr. Lick's plans two years before the beginning of astronomical work at Mt. Hamilton. During those two years he was President of the

University. He went to reside at the Observatory in 1888, and gathered about him an excellent corps of astronomers; among the first, Professors Keeler, Burnham, Barnard, and Schaeberle. His Directorship was marked by untiring energy and great executive ability. During his incumbency the little company of Mt. Hamilton astronomers gave their Observatory an unsurpassed rank in the scientific world.

Professor Schaeberle.

Professor J. M. Schaeberle was appointed Acting Director from January 1st. Much to the regret of the Board, he afterwards resigned his position at the Observatory, April 12, 1898, and left Mt. Hamilton on June 1st. The Board passed the following resolution, in recognition of Professor Schaeberle's long-continued and distinguished service at Mt. Hamilton:

Resolved, That the President of the University express to Professor Schaeberle our high appreciation of his valuable services to science, and our great reluctance to consider the resignation of one who has added so much to the reputation of our great Observatory.

2nd—That Professor Schaeberle be urged to reconsider his resignation.

3rd—That his untiring efforts on behalf of the Observatory are gratefully acknowledged, and that in view of the fact that during a service of nearly ten years, he has not applied for an extended leave of absence, except when in charge of eclipse expeditions, a leave of absence for one year, and with full pay, be offered him, for rest and recreation.

Professor Schaeberle declined this proposal, and his resignation was reluctantly accepted. The honorary degree of LL.D. was conferred on him at our Commencement, May 18, 1898.

Assistant Astronomer A. L. Colton resigned his position September 21, 1897.

New Director.

To fill the vacancy caused by Dr. Holden's resignation, Professor James E. Keeler was appointed Director at the meeting of March 8, 1898, and began his service on June 1st. Professor Keeler was one of the earliest and most prized astronomers at Mt. Hamilton. In 1891 he was elected Director of the Observatory at Allegheny, where he remained till his return to California. He gained a high reputation for his work at Allegheny, and in answer to our inquiries received the unqualified indorsement of the most distinguished astronomers in the country.

Closer Ties in Astronomy.

The Regents have taken action to secure a closer connection of the Lick Observatory, which is a constituent Department of the University, with the Astronomical Department at Berkeley. (See the SECRETARY'S REPORT for 1896–7, pp. 15–17.) Within a few months, acting under the instructions of the Board, Director Keeler and Assistant Professor Leuschner have made a schedule of lectures to be given the second half-year by the Lick Astronomers at Berkeley; and their proposals have been adopted by the President.

New College.

The Regents have this year established a new College, to meet a want which has found growing expression for several years past. Our peculiar relations with the countries bordering on the great Pacific Ocean have suggested the need of courses of study adapted to men of commercial pursuits and affiliations. There has now been established a College of Commerce, intended to uphold the standard of a liberal education, and at the same time to give instruction in various subjects essential to an understanding of our relations with foreign nations, and of the new conditions of life throughont mercantile and business circles. Our University is a pioneer in this field. The curriculum of the new College will include many subjects heretofore given; *e.g.*, in history and political science, in commercial and international law, in technological studies, in modern languages; and many other subjects will be added in due time. Important geographical courses are already in progress. The Oriental Chair is now providing courses in Chinese, both classical and colloquial. For a more detailed statement, see the statement of the Dean of the new College, Professor Plehn, reprinted in an appendix to this REPORT. Especial attention is called to the facilities offered to those who are preparing for high positions in the Civil Service, such as Consulates in foreign countries.

Number of Courses.

The courses offered for instruction at Berkeley have been for 1896–97, 433; for 1897–98, 511.

Number of Students.

The number of students enrolled at Berkeley was for 1896–97, 1496; for 1897–98, 1665. Thus far, for the year 1898–99, there is an enrollment assuring us of still further increase.

Enlisted Men.

The student roll for the new year is lessened by the enlistment of a considerable number in the army. The Spanish war took from us not only our much valued Commandant (Major Cloman) and Assistant Professor Hayne, but also several scores of students.

Hard Times.

To the hard times in California is due the absence of not a few whose circumstances compelled them to leave College. It is remarkable that so many in similar straits struggle forward in their studies, eager and undismayed.

Credentials Committee.

The number of undergraduate students from other colleges and from schools outside the State has become so great that the Academic Council has established a Committee on Credentials. In the brief period within which this committee has acted it has considered credentials from England, Ireland, France, Germany, Greece, Canada, Australia, New Zealand, Hawaii, and nearly every State in the Union. The variety of their origins testifies to the cosmopolitan character of the population.

A Wrong Impression.

It is unfortunate that new-comers so often prefer to give their new places of residence for publication in the REGISTER, rather than those from which they have come; thus giving rise to the erroneous opinion that the attendance at the University is confined to California, and mainly to the Bay region. Perhaps the publication in the REGISTER of the the birthplaces as well as the supposed places of residence of students would tend to remove the impression, now too common, that the University enjoys mainly local patronage. California families frequently move to Berkeley from distant counties in order to obtain the privileges of the University; and afterward they return to their former homes. Consequently the University does not always receive credit for the extent of its services to citizens and residents of the whole State.

A Year Gained For Law Studies.

The Department of Jurisprudence has been so much strengthened at Berkeley by the transfer of Assistant Professor Hengstler, and the valuable lectures of Judge Lindley and Dr. Gutsch, that students intending to enter the Hastings College of the Law can gain an advanced standing. The satisfactory passing of six specified courses at Berkeley entitles them to admission to the Middle Class in the Law College.

Two Years For Medical Studies.

A like arrangement gains two years for students intending to enter the Medical Department. A three years' curriculum has been marked out in our College of Natural Sciences, which gives special preparation for Medicine, and admits to the second year in our Medical Department. On the completion of the medical course, such students as are jointly recommended by the Medical Faculty and the Faculty of the College of Natural Sciences may receive the degree of B.S. together with that of M.D.

Graduate Department.

The increase of students in the graduate department at Berkeley has justified the establishment of the "Graduate Council," corresponding to the "Academic Council" for undergraduates. There were 119 graduate students enrolled in 1896–97, and 174 in 1897–98. In 1886–87 there were 9 graduate students, and in 1887–88, 12. The graduate department is open to all persons who hold a respectable Bachelor's degree, and the annexed table shows the variety of Colleges and Universities represented.

COLLEGES AND UNIVERSITIES REPRESENTED IN THE GRADUATE DEPARTMENT, 1896–97; 1897–98.

NAME	No. of Students 1896–97	No. of Students 1897–98	NAME	No. of Students 1896–97	No. of Students 1897–98
Add-Ran University	—	1	Missouri, University of	1	—
Amherst	—	1	Michigan	4	—
Amsterdam, University of	1	—	Muskingum	1	1
Bates	1	1	Northern Illinois	—	1
Bethany	1	1	Nebraska	—	1
Beloit	—	1	Nevada	2	3
Brown	2	2	Northwestern	—	1
Carlton	1	—	Oberlin	2	3
Copenhagen, University of	—	2	Occidental	—	1
Colorado	1	—	Ohio Wesleyan	1	—
Columbia	1	—	Oregon Agricultural	—	2
Cornell College	1	—	Pennsylvania College	1	1
Cornell University	1	—	Penn College	—	2
Davidson	2	1	Pomona	4	7
Dublin	—	1	Princeton	1	—
Georgia, University of	—	1	Roanoke	—	1
Griswold	—	1	Rome, Gregorian Univ.	1	1
Haverford	—	1	Smith	1	1
Harvard	3	4	South'n California, Univ. of	—	1
Heidelberg (Ohio)	—	1	South Carolina, Univ. of	—	1
Illinois, University of	—	1	Southwestern Pres. Univ.	1	1
Illinois Wesleyan	—	1	St. John's College	1	—
Iowa Wesleyan	—	1	Tabor	1	1
Johns Hopkins	—	1	Vassar	—	1
Kansas Agricultural	—	1	Vermont University	1	—
Kansas, University of	—	2	Washington	1	—
Leland Stanford Jr. Univ.	4	6	Western Reserve	—	1
London School of Mines	—	1	Wellesley	1	3
La Grange	—	1	Willamette	1	1
Mass. Inst. Technology	—	1	Washburn	1	—
Marietta	1	—	Yale	2	4
McKendree	1	1			
Mills	1	3	Total number of Colleges and Universities	35	50
Minnesota	—	1			

In order to administer properly the work of students of such varied training, the Graduate Council has appointed committees which not only enforce the conditions for advanced degrees, but are careful to see that no student shall become a candidate for such degrees until his standing as a Bachelor has been made equal to that of our own graduates. At the same time our policy is sympathetic and encouraging to many incompletely developed institutions, and in estimating the value of a Bachelor's degree obtained elsewhere the result in mental power and knowledge is emphasized, rather than the need of a particular undergraduate course parallel to ours. Indeed, our group elective system, combined with our system of prescribed studies, places our Bachelor's degree in a class by itself. Therefore some students in the graduate department have proceeded to our Bachelor's degree, upon learning that our Master's degree would require more than a year's study. Although on general principles the repeating of the Bachelor's degree is not encouraged, yet such students value highly the evidence of a year's study here. The Master's degree has been conferred on graduate students more frequently than either the Bachelor's or the Doctor's, and in most cases the recipients have been actual or prospective teachers in the high schools. The conditions for the Ph.D. degree are severe; hence it has been but rarely conferred.

Trend of Graduate Study.

Dean of Young Women.

From thirty-five to forty per cent. of the students at Berkeley are young women. Heretofore the policy of the Board has been to appoint no women on the teaching staff. Since the coming of Mrs. Hearst into the Board of Regents, the question has been often asked, Why not allow women a representation in the Faculty? Without suggesting what the answer should be on broad lines, it does seem fitting that there should be a Dean for the young women of the University; an educated woman, of such reputation, wisdom, and sympathetic personality as would make her a trusted counselor and guide. She should be able to teach, but teaching would be much the less important side of her work.

Summer Schools.

Summer Schools have been held in the Departments of Physics and Chemistry, with a good attendance as heretofore. It is the purpose of the Board to organize summer instruction in a much larger number of subjects. In two Colleges, those of Mining and Civil Engineering, a certain amount of summer vacation work is prescribed.

Extension Courses.

University Extension Courses have been given, as heretofore, in San Francisco, and the attendance on many of the courses has exceeded the seating capacity of the audience room.

Farmers' Institutes.

The very important Extension work of the Farmers' Institutes has been prosecuted with increased vigor. About eighty institutes were held during the year just closed, and one hundred are scheduled for the current twelvemonth. Efficient organizers have been employed; local interest has been greatly awakened; one or more of the Agricultural faculty have attended in every place; and experts in various subjects have been obtained to lecture at the points where their specialties were under discussion. Many testimonials of the interest and profit of these gatherings have come to the Board of Regents in copies of resolutions adopted by the attendants. They all commend this phase of the University's work, and urge its continuance and expansion.

Accrediting Schools.

Our relations to the public school system of the State have continued to be intimate and fruitful of good results. More schools have been visited than ever before, and more schools are on our accredited list. By reason of the many calls on the University funds, the allotment for examiners of the schools has for several years been kept so low as to retard the progress of the work. The system of accrediting has fully justified itself by the experience of many years. It has confessedly been of great value to the schools, in stimulating them to improve their quality, and in setting a common standard by which their quality could be estimated. It has brought reciprocal benefits to the University in securing a better class of students, and in a more complete mutual understanding between the schools and the University. The accrediting work is far too important to be given up.

But if it is to be continued, and is to meet the increasing demands of the schools, it ought to be more thoroughly provided for. Objections have been raised, not to our system, but to our methods of carrying it out. We see just where the chief trouble lies; *viz.*, in insufficient appropriations for the work. Our examiners must travel from one end of the State to another, and visit about a hundred schools. If the five or six examiners should each spend a day or two with each school, the funds at their disposal would give out midway in their travels. Moreover, if at this slow rate they completed their rounds, they would be gone so long from their classes as to necessitate the employment of substitutes at home. As it is, they snatch bits of time for a given section of the State, and the examining is partly deferred till the long summer vacation—too late for the best good of the schools. The Faculty earnestly recommend the appointment of a commission of experts from their number, who for a given year should go over the whole State, leisurely enough to become acquainted with the organization and inner spirit of the schools. Their absence from the University will necessitate the employment of temporary substitutes. Three places, at least, would have to be supplied for half of the year. This ideal plan it is simply impossible to carry out with an appropriation of $1500.00, though the railways should continue their generous help of reduced fares.

More money is therefore a pressing need. We cannot ask the schools to pay the expense of visiting them, when there is one chance in three that the verdict of the examiners will be adverse; and it would, really or supposedly, affect unfavorably the independence of the examiners. We hesitate to ask a special appropriation from the Legislature, although this expenditure is chiefly for the benefit of the State school system. There is need that the situation be fully canvassed, and that we all come to see the absolute necessity of larger means for this most important work.

If such a commission made a longer stay in each section of the State, it would be possible for them to give short courses of Extension lectures, and thus respond to calls which we are now unable to meet. It would seem that the special province of the University, in contributing to the general culture demands of the people of the State, is to make use of the lines of influence opened to us through the schools. It is a pity to neglect these many open doors for the sake of saving a very small sum of money.

Eastern Educators.

Within these two years the Philosophical Union has brought out from the East two distinguished educators; Dr. Wm. T. Harris, United States Commissioner of Education, and Professor Wm. James, of Harvard University. Both of these gentlemen appeared before important gatherings of teachers.

Participation in Eastern Gatherings.

The University has been represented at various meetings of scientific and learned associations during the last two years, notwithstanding our distance from the places of meeting. Professor LeConte attended several gatherings in the latter part of 1896. In August, at Buffalo, the American Association for the Advancement of Science. Also, the Geological Society of America. In September, by invitation, at Liverpool, the British Association for the Advancement of Science. In October, as delegate from our University, the Sesquicentennial of Princeton; where he received the degree of LL.D. In November, the National Academy of Science, in New York. In December, the Geological Society of America, of which he was President, and where he delivered the presidential address. The Agricultural Department has sent representatives to national meetings: Professor Loughridge to Minneapolis, in July, 1897; Professor Hilgard to the Irrigation Congress at Denver, July, 1898. Professor Jaffa is detailed for the meeting in Washington, November,

1898. Professor Leuschner attended in September, 1896, an international meeting of the Astronomische Gesellschaft, in Bavaria. Professor Lawson attended in August, 1897, the meeting of the International Geological Congress, at St. Petersburg. It was a very noteworthy gathering, from the large attendance of distinguished men, and especially the royal hospitality with which the government provided free scientific excursions for the members of the Congress. Our delegate visited, afterward, the University centers of many other European countries. Professor Rising attended the Third International Congress of Applied Chemistry, held at Vienna, July 23rd to August 3rd of this year. His name appears in the list of vice-presidents. The Congress was hospitably entertained by the City of Vienna, and important discussions took place in regard to the chemistry of foods, and food legislation. Professor Brown attended the recent meeting of the National Educational Association at Washington, D. C., and was made vice-president of the department of higher education.

To some learned Associations contributions were sent by Professors who could not go in person; *e.g.*, Professor Clapp, by request, prepared a paper for the national Classical Conference at Ann Arbor, in March, 1898. Professor Plehn sent a paper to Baltimore, December, 1896, for the American Economic Association; one to the British Association at Toronto, August, 1897; and another is due to the American Economic Association, in December, 1898.

We have been well represented in the Societies and Associations of our own State; *e.g.*, the California Astronomical Society has had two of the Lick Observatory Professors for its Presidents. The President of the California Academy of Sciences is our Professor Ritter. Some noteworthy addresses have been given by our Professors at the Teachers' Associations.

State and Levi Strauss Scholarships.

After the appropriation made by the last Legislature was announced, the Regents set apart the sum of $3,500 for twenty-eight scholarships, of the value of $125 each, to be apportioned equally among the seven Congressional Districts of the State. This had no sooner been done than Levi Strauss, Esq., of San Francisco, made a gift of an equal sum to be used in the same way. Mr. Strauss's letter to the Board was as follows:

San Francisco, March 6, 1897.

Regent J. B. Reinstein,

Dear Sir:—I have noted in the newspapers that while the Legislature was considering the bill to increase the income of the University of California, a suggestion was made to set apart $3,500.00 per annum to aid worthy and poor students from each of the Congressional Districts of the State to obtain an education at the University.

I should be pleased to be permitted to duplicate the generosity of the State in the matter of said scholarships, and request you to kindly communicate the terms of this letter to the Honorable the Board of Regents of the University.

The University of California has already risen to a plane that challenges the admiration of the entire country, and I deem it a privilege to aid those connected therewith.

The proper officers are hereby authorized to draw on me each year, until further notice, for the sum of $3,500.00. I am, dear sir,

Yours very truly,
LEVI STRAUSS.

In response to this offer, Regent Wallace presented the following resolutions, which were unanimously adopted:

WHEREAS: The sum of $3,500.00 has been set apart annually from the income furnished by the State to the University of California, to be distributed equally among the Congressional Districts of this State, for the purpose of aiding, not to exceed twenty-eight (28) poor and deserving students of the University, each year;

AND WHEREAS, Mr. Levi Strauss, of San Francisco, has duplicated the generosity of the State, for a like purpose;

Resolved: That the thanks of the Board of Regents be extended to Mr. Strauss, not only for subserving the noble purpose of aiding the worthy poor to obtain an education, and thus filling a long felt want at the University, but also because the terms of his gift constitute a significant recognition that the purposes and beneficence of the University of California extend to every portion of the State alike.

Resolved further: That the disposition and procedure in connection with the said scholarships, shall be similar in general to the procedure and disposition of the State of California Scholarships.

Resolved further: That the said scholarships shall be known and designated as the "Levi Strauss Scholarships."

The University Scholarships and the Levi Strauss Scholarships thus give aid to fifty-six needy young men and women, eight from each district. As tuition is free in this University, these scholarships count for much more than scholarships in institutions receiving fees for instruction. Our free tuition is really a scholarship for every one of the students. Yet there are many who are so handicapped by poverty as to make a college course impossible without this additional help. For every application acted on favorably, there are many that must be denied. A large number of our students are almost entirely dependent on their own exertions for support. The Phebe A. Hearst scholarships, for eight young women, afford more substantial aid, and have been an incalculable benefit to the recipients.

Gratuitous Services.

Gratuitous service in the Semitic Department has continued to be rendered, during these two years, by the Rev. Dr. Voorsanger. His energy is rewarded by seeing the department increasing in numbers, by welcoming a learned colleague in Associate Professor Margolis, and by securing very valuable gifts to the Semitic Department of the Library.

Other gratuitous services have been rendered by Dr. C. R. Greenleaf, U. S. A., Dr. Gustav Gutsch, and Hon. C. H. Lindley.

New Claims.

New claims upon the University are made every year. So many are the lines of instruction already, so great the need of strengthening them, that new calls can seldom be met at once. In the great interest of agriculture, several proposals demand serious consideration. A School of Architecture should be added to our Engineering departments. We are pledged to do something, as soon as practicable, for the thousands of Scandinavians who petitioned us in behalf of the Old Norse language. In Chemistry our State Analyst has no legislative appropriation to help on the cause of pure foods for the people.

Commissions.

At a meeting of the Regents held June 8, 1897, the President introduced the following resolution at the request of an absent Regent, and the resolution was adopted by the Board:

Resolved: That while the Board of Regents deems it expedient and just to appropriate a limited sum to conserve the work of the Viticultural and Forestry Commissions during the next two years, yet the Board deems it important to lay down this general principle, *viz.:* That the University of California must not in the future be expected to conduct or maintain any special commissions, other than those which are strictly educational, the expense of which is to be borne out of the general University funds. The taking on of such extraneous burdens the Board believes will most seriously impair the proper work of the University, and render impossible the best results from the special work of the Commissions.

Temporary Auditorium.

One building is immediately and urgently called for, *viz:* a large temporary auditorium. At the last Commencement we depended on the generosity of Mrs. Hearst for a hired tent. There is no room in all our Berkeley buildings which will hold a quarter of the body known as The Associated Students, an organization most important in giving a proper tone to University feeling. Our best resort is to borrow the largest room in Stiles Hall; but this is too small even for an incoming Freshman Class. If the President wishes to counsel the students, there is no place in which to meet them together. A cheap wooden building may have many uses, even when a permanent auditorium is secured. Till then, it is an absolute necessity.

State Plan of Insurance.

The State has decided to be its own insurer against losses by fire in buildings owned by the State. This is doubtless a wise policy, inasmuch as in the long run these losses will be less than the aggregate insurance charges. Large importing firms pursue a like policy in marine insurance. There is, however, one corollary from the State's self-insurance, which has hardly come to be recognized, *viz.*, that the State should make good any such loss to the institution which has suffered it. A concrete case is presented in the loss of our Agricultural Hall. It was totally destroyed by fire, and it has cost to rebuild $12,020.33. The new building is better than the old, but that could have been insured for many thousands of dollars. The losses of the department in equipment and collections were also very serious.

Department of Music.

A much needed addition to our departments is a School of Music. Its absence is partly accounted for by the free tuition basis of all our instruction. Yet the University of Michigan, which has low tuition fees, has developed a fine musical department by the aid of those who are interested in this very important pursuit. One of the most useful endowments awaiting private benefactions is the establishment of a good Department of Music.

Dormitories.

There seems to be an increasing call for the beginning of a dormitory system on the University grounds. It is claimed that such a provision for students' homes would furnish a more thoroughly unifying center of influence, and help to develop a more vigorous University spirit. The experience of most of the Eastern Universities is appealed to, whose graduates recall their centrally clustered life as imparting a peculiar charm to college days. Our Regents do not feel at liberty to build dormitories with University funds. If we need this new unifying influence, it must be gained through private sympathy and beneficence. The new architectural plan will leave suitable sites where, as in the older institutions, student homes can be erected which will transmit to many generations the names of the generous donors.

Library Needs.

A special appeal to lovers of science and learning is to be urged in behalf of the University Library. Here is the central leverage of scholarly study for all departments of the University. Our Library has had a steady growth, and has been fortunate in the gifts received during the past few years. But its needs altogether outrun its accessions. Comparatively little is allotted to it from the general fund, and the special funds (chiefly the Reese fund) are far too small for its pressing demands. Every department is clamoring for books and journals to enable it to keep up with the intellectual movement of the times. Imperfect as our collection is, it is eagerly resorted to by our more than fifteen hundred students, and every working day sees the building very much over-crowded. Additional space is a near and vital necessity.

In the succeeding pages will be found Subsidiary Reports: a statement by the Dean of the new College of Commerce, Professor Plehn, chiefly a reprint from the Merchants' Association Review; from Librarian Rowell; from Director Keeler of the Lick Observatory; from the San Francisco Art Association; from Deans of Professional Departments; and statistical addenda compiled by the Recorder of the Faculties.

Also, a list of published writings of Professors and Instructors; and the customary financial statement. Full details of the business transactions of the Board will be found in the Report of its Secretary.

Respectfully submitted:

Martin Kellogg,
President of the University of California.

SUBSIDIARY REPORTS.

OF THE DIRECTOR OF THE LICK OBSERVATORY.

OF THE ASSISTANT SECRETARY OF THE SAN FRANCISCO ART ASSOCIATION.

OF THE DEAN OF THE HASTINGS COLLEGE OF THE LAW.

OF THE DEAN OF THE MEDICAL DEPARTMENT.

OF THE SECRETARY OF THE POST-GRADUATE MEDICAL DEPARTMENT.

OF THE DEAN OF THE COLLEGE OF DENTISTRY.

OF THE DEAN OF THE COLLEGE OF PHARMACY.

OF THE SECRETARY OF THE FACULTY OF THE VETERINARY DEPARTMENT.

OF THE UNIVERSITY LIBRARIAN.

OF THE DEAN OF THE COLLEGE OF COMMERCE.

PUBLISHED WRITINGS OF MEMBERS OF THE FACULTIES.

STATISTICAL ADDENDA COMPILED BY THE RECORDER OF THE FACULTIES.

FINANCIAL STATEMENT.

REPORT OF THE DIRECTOR OF THE LICK OBSERVATORY

MOUNT HAMILTON, September 1, 1898.

To the President of the University,

DEAR SIR:—I have the honor to submit my first report as Director of the Lick Observatory. As I have been in charge of the Observatory for only three months (from June 1, 1898), it seems proper that this report should be a brief one.

ORGANIZATION OF THE LICK OBSERVATORY.

MARTIN KELLOGG, *President of the University.*

JAMES E. KEELER, *Director and Astronomer.*
W. W. CAMPBELL, *Astronomer.*
R. H. TUCKER, *Astronomer.*
W. J. HUSSEY, *Astronomer.*
C. D. PERRINE, *Assistant Astronomer and Secretary.*
R. G. AITKEN, *Assistant Astronomer.*
W. H. WRIGHT, *Assistant Astronomer.*
E. F. CODDINGTON, *Fellow.*
R. T. CRAWFORD, *Fellow.*
FRANK E. ROSS, *Fellow.*
H. K. PALMER, *Fellow.*

JOHN MACDONALD, *Foreman and Machinist.*
J. L. BANE, *Carpenter.*
E. ZENGELER, *Instrument-maker.*
W. W. PAULI, *Janitor.*
N. D. SOTO, *Laborer.*
PAUL SOTO, *Laborer.*

Mr. Aitken, who had previously been temporarily employed, was permanently appointed Assistant Astronomer on May 10, 1898. Mr. Wright, who had been employed, with the aid of the Crocker Fund, on spectroscopic determinations of motions in the line of sight, during Professor Campbell's absence in India, was also permanently appointed Assistant Astronomer on May 10th, filling the vacancy left by the resignation of Mr. A. L. Colton.

NEW FELLOWSHIPS IN ASTRONOMY AT THE LICK OBSERVATORY.

When I took charge of the Observatory on June 1st, there was a vacancy caused by Professor Schaeberle's resignation. It was thought best not to fill this vacancy at once, but to appoint three Fellows in Astronomy, who should hold office for one year, or so long as the vacancy above mentioned should exist. In order to bring about a closer relationship between the two astronomical departments of the University, it was decided that the new Fellows should be graduates of the University of California recommended by the Director of the Students' Observatory at Berkeley. Messrs. Crawford, Ross, and Palmer were accordingly appointed on July 12th, and assumed the duties of their positions on August 1st. They have been assigned as assistants to the astronomers of the Observatory, and are engaged both in the work of observing and in various computations. At the discretion of the Director they are allowed to spend part of their time in study at Berkeley during the winter months.

LECTURES AT BERKELEY BY MEMBERS OF THE LICK OBSERVATORY STAFF.

At a meeting of the Board of Regents on June 14th, at which I was present, the President of the University and the Director of the Lick Observatory were requested "To report a plan for such instruction at Berkeley or in San Francisco, to the students of the University by the astronomers at the Lick Observatory, as they may think best for the University." Associate Professor Leuschner was authorized by the President to visit Mt. Hamilton and to explain to me the courses of instruction at Berkeley. The President himself came to the Observatory on July 8th.

As a result of these conferences it was decided that the four astronomers of the Lick Observatory should each deliver two lectures at Berkeley, on subjects to be chosen by themselves, during the second term of the academic year 1898-99, and that these lectures should form part of Course 1, Modern Astronomy. The dates of the lectures are to be fixed by the President of the University.

The question of instruction at Berkeley by members of the Lick Observatory staff is one which has received much attention from my predecessor and from the Faculties of the University. General regulations concerning such instructions are laid down in a report submitted to the Board of Regents by the Chairman of the Committee on Internal Administration and the Chairman of the Committee on the Lick Observatory, and adopted by the Board on December 22,

1896. The plan which will be tried is in conformity with these regulations. If successful it may be extended and improved in future years, and I trust that it may prove to be beneficial to both departments of the University.

The titles of the lectures for the present year are as follows:

James E. Keeler: 1. The Methods of Astrophysical Research. 2. The Classification of the Stars.

W. W. Campbell: 1. Spectroscopic Determinations of Stellar Motions. 2. Some Observations bearing on the Question of Sidereal Evolution.

R. H. Tucker: 1. Astronomy of Precision—Aims. 2. Astronomy of Precision—Methods.

W. J. Hussey: 1. The Surface Features of Mars. 2. A Review of the Methods and Results of Double Star Astronomy.

STUDENTS AT THE LICK OBSERVATORY.

Professor H. D. Curtis, of the University of the Pacific, and Mr. F. G. Cottrell, a graduate of the University, have pursued studies here during the past summer.

Since the three new Fellows already referred to have taken up their residence on Mt. Hamilton, all the available quarters at the Observatory are very fully occupied. It will hardly be possible to admit more students unless a special building is erected for their accommodation. The subject is one which it will be necessary to consider in the near future.

BUILDINGS AND INSTRUMENTS.

All the buildings are in good condition. The main building, the meridian circle house, the photoheliograph house and some others have been painted during the present summer. One of the laborers' cottages has been enlarged and improved.

In June the elevating floor of the 36-inch telescope was found to be about three inches out of level. It was restored to its proper position by uncoupling the equalizing gear. Marks were made by which the cause of the difficulty can be ascertained if it should occur again.

THE CROSSLEY REFLECTOR.

This instrument, generously presented to the Lick Observatory by Mr. Edward Crossley, and set up in its present position by friends of the Observatory, has not yet been brought into working order. I have taken it under my own charge. In July the pier was cut down two feet, with the effect of making the telescope much more manageable and of bringing the spectroscope within the dome. Some further changes will also be necessary. The new driving clock designed by Professor Hussey and the spectroscope designed by Professor Campbell are nearly completed. Both these instruments have been made here, with the aid of a gift of money from Miss C. W. Bruce.

The Crossley reflector should be specially valuable for spectroscopic investigations and for the photography of faint objects, particularly comets. The figure of the large mirror is excellent. Arrangements have been made for resilvering both mirrors.

WORK OF THE OBSERVERS.

A detailed account of the scientific work of the Observatory will be left for subsequent reports. I may, however, at this time, call attention to the discovery of three comets in one week as a noteworthy achievement. The comets referred to are as follows:

June 11, 1898. Comet *c*, 1898. E. F. Coddington, Fellow.
June 14, 1898. Comet *e*, 1898. C. D. Perrine, Assistant Astronomer.
June 17, 1898. Wolf's Periodic Comet of 1884. W. J. Hussey, Astronomer.

The first of these comets was discovered by photography.

THE INDIA ECLIPSE EXPEDITION.

A few days before his death, the late Col. C. F. Crocker offered to defray the expenses of an expedition to India to observe the total eclipse of the sun on January 22, 1898, and also to provide an assistant at the Observatory, in order that the spectroscopic work with the great telescope should suffer no interruption. This generous offer of Col. Crocker was immediately confirmed by the executors of his estate. Accordingly, Professor Campbell was authorized to proceed to India with the apparatus necessary to observe the eclipse. He arrived in Bombay on December 5, and selected Jeur as an observing station. Able volunteer assistants were found among the American residents and the officers of the English army and navy. On the day of the eclipse, Professor Campbell's extensive programme was carried out with complete success in every particular. A general account of the expedition has been printed in the Publications of the Astronomical Society of the Pacific, No. 63, and a complete official report will be prepared during the unfavorable observing season of the coming winter.

PUBLICATIONS.

Two volumes of the Observatory publications are ready for the press,—(1) Meteorological Observations at Mt. Hamilton, July 1, 1888, to July 1, 1895, by C. D. Perrine, and (2) Meridian Circle Observations of Standard Stars, by R. H. Tucker; but owing to the lack of available funds at the State Printing Office, they cannot be printed at the present time. Another volume of Meridian Circle observations is in preparation.

HONORARY DEGREES, ETC., CONFERRED ON ASTRONOMERS OF THE LICK OBSERVATORY.

At a meeting of the Board of Regents of the University of California on May 17, 1898, the honorary degree of LL.D. was conferred on Professor J. M. Schaeberle, in recognition of his scientific achievements and his eminent services to the Lick Observatory.

The Lalande Prize was awarded to Mr. C. D. Perrine, for his discoveries of comets and investigations of their orbits, by the French Academy of Sciences in 1897.

The Rumford Medal has been awarded to the Director, for his spectroscopic researches, by the American Academy of Arts and Sciences.

WATER SUPPLY.

In the winter of 1897–98 the rainfall at Mt. Hamilton was very light, as it was in all parts of the State of California. It was feared that the springs at the Aquarius reservoir would fail early in the present summer, and strict economy was practiced in the use of water for domestic purposes. I am glad to say, however, that the supply of water, used in this way, has been sufficient, although the number of persons permanently residing on the mountain is now, all told, about fifty, or considerably greater than it has been at any time in the past. The springs have continued to flow, and it does not seem likely that they will ever be put to a severer test than this.

FOREST FIRES.

Fires in the surrounding country, either accidental or intentional, have been very common during the summer, and the smoke from them has at times perceptibly obscured the sky. For some classes of astronomical work this smoke is not especially disadvantageous, but for others it is very distinctly so, and a matter for serious concern. It is to be hoped that the forest fires will not become a feature of our summer season.

On August 13, a fire broke out in the rubbish heap near the barn. but it was quickly put out by the Observatory employees.

VISITORS.

The number of visitors registered from June 1, 1896, to June 1, 1897, is 3603; from June 1, 1897, to June 1, 1898, is 4856. The total number from June 1, 1888, to June 1, 1898, is 51,995. Probably about ten per cent. of the visitors fail to register.

GIFT OF PORTRAIT OF CAPTAIN FLOYD.

Miss H. A. L. Floyd has, at my request, presented to the Observatory a fine portrait of her father, the late Captain R. S. Floyd, President of the Lick Trustees. It has been hung in the visitors' room.

Additional items of interest concerning the Lick Observatory will be found in the Report of the Director, published in full in the ANNUAL REPORT OF THE SECRETARY of the University, for the year 1897–98.

Respectfully submitted:

J. E. KEELER,
Director of the Lick Observatory.

REPORT OF THE SAN FRANCISCO ART ASSOCIATION.

(MARK HOPKINS INSTITUTE OF ART.)

San Francisco, October 26, 1898.

To the President of the University,

Dear Sir:—Since my last bi-annual report, the School of Design under the direction of The San Francisco Art Association, has continued to make satisfactory progress both in the number of students attending and in the quality of the work shown at the exhibitions, held at the close of the school sessions in May, 1897, and May, 1898. The number of students attending the school at the close of the last scholastic year, May, 1898, was 141, that being about the full capacity of the school-rooms, without uncomfortably crowding them, and any increase of students would necessitate the employment of additional instructors.

The awarding of competitive medals has been discontinued at the request of the students themselves, and eight free scholarships have been established instead.

The percentages for the examinations for the University Certificate have been fixed at so high a standard that only two students have been able to successfully pass the required examinations, and only two certificates have been awarded since the establishment of the Certificate of Proficiency, they being awarded to Mr. Charles L. Turner and Miss Annie M. Bremer.

Mr. Arthur F. Mathews, the Dean of the Faculty, has been granted a leave of absence until May, 1899, and is now traveling in Europe, and will visit all the best schools of art, both in Europe and the United States, before resuming his position of Dean of the school.

The regular exhibitions of the Art Association, of the work of resident artists, have been given, and have been fairly attended by the members and visitors generally.

A money prize of one hundred dollars, offered by Mr. Edward F. Searles, for the best example of figure painting by a resident artist, entered for exhibition at the annual exhibition of 1897, was awarded to Mr. Arthur F. Mathews.

The free day continues to interest the people, the visitors numbering from 1500 to 3000 on each free day.

The rooms were given for the month of April, 1898, to the Woman's Hospital for an exhibition of portraits, and this deserving charity realized about $2,500.00 from the exhibition.

The donations to the Association since the last report have been 106 Braun photographs from works by the Old Masters, presented by the Hon. James D. Phelan, and 60 photogravures from Edward F. Searles. Suitable stands have been erected for their proper display, and one of the best rooms in the building has been devoted to that purpose.

The late Mrs. M. B. M. Toland devised to the Association 110 original designs by some of the best American illustrators, these designs having been used to illustrate her poems.

A plaster cast of "Beatrice Cenci in Prison" by Lamberto Goria, was presented by Dr. Paolo De Vecchi; a large oil painting by M. Strauss, presented by the Wm. Babcock heirs; an oil portrait of Ex-President James D. Phelan, by Frederick Yates, presented by Mr. Phelan; and a "Marine" by S. Walters, presented by Mr. Oliver Eldridge.

There have been received as donations to the library one volume of "Lives of Italian Painters" and three volumes of "Walpole's Anecdotes of Painters" from Mrs. Benj. P. Avery; nine volumes of the "Galerie de Palais de Versailles" from Mr. Emil Greenbaum; and four volumes of the "Galerie de Florence" and one volume of "European Architecture" from Mr. Samuel P. Avery. Other donations to the library have been received from Mr. Henry Heyman, Mrs. E. E. Caswell, and Mr. R. Hall McCormack.

Respectfully submitted:

J. R. MARTIN,
Assistant Secretary.

REPORT OF THE DEAN OF THE HASTINGS COLLEGE OF THE LAW.

(LAW DEPARTMENT, UNIVERSITY OF CALIFORNIA.)

San Francisco, November 6, 1898.

To the President of the University,

Dear Sir:—The condition of the Hastings College of the Law has not materially changed since my last report to you. The number of students is nearly the same as last year. A new instructor—Mr. Sheffield S. Sanborn—has been added to the teaching force, which now numbers five persons. The building erected by the State for the use of the College is nearly completed, but it cannot be occupied until a law library, which the College does not now possess, is in some way provided for.

Respectfully submitted:

Charles W. Slack,
Dean.

REPORT OF THE DEAN OF THE MEDICAL DEPARTMENT.

San Francisco, October 26, 1898.

To the President of the University,

Dear Sir:—I have the honor to submit the following report of the progress and needs of the Medical Department of the University. Since the last report submitted, the buildings, for which the Legislature generously appropriated $250,000, have been completed and accepted. The building devoted to the Medical Department is admirably adapted for instruction in medicine in its modern form. Ample accommodation has been made for laboratory work in Physiology, Histology, Pathology, Chemistry, and Bacteriology.

The building was dedicated with appropriate exercises on October 22, 1898. There can be no doubt that the opening of the building marks a new era in the life of the University. It not only means broader instruction in medicine, but also that the State will estimate at their righful values the great professions of medicine and law.

The Medical Department of the University is in the front rank of American medical colleges in regard to entrance requirements. Applicants are required to present credentials entitling them to admission to the academic branches of the University, or in lieu thereof to pass the entrance examinations at Berkeley. Notwithstanding these requirements, there has been a gratifying increase in the number of students.

There is urgent need of funds by which the new building may be well equipped, and by which the grounds surrounding the new buildings may be properly cared for. The Faculty earnestly hopes that the Board of Regents will appreciate its efforts to raise the standard of medical education, and devise some means by which the department may be given some source of revenue with which to meet the expenses of the institution, besides the fees paid by the students.

Respectfully submitted:

R. A. McLean,

Dean of Medical Department.

REPORT OF THE SECRETARY OF THE POST-GRADUATE MEDICAL DEPARTMENT.

(SAN FRANCISCO POLYCLINIC.)

San Francisco, October 14, 1898.

To the President of the University,

Dear Sir:—Since the last Biennial Report there have been no particularly noteworthy changes in the San Francisco Polyclinic, the Post-Graduate Medical Department of the University of California. The hope, expressed two years ago, of systematising and concentrating instruction has not yet been fulfilled; for the extra-urban practitioners who avail themselves of the advantages offered by this institution still come at such irregular intervals, and often for such short periods, that at no one time are the applicants for instruction in the several branches sufficiently numerous to permit the formation of classes. The Polyclinic, however, thoroughly fulfils its mission as a Post-Graduate School by the unrestricted opportunities for the completion of their general professional education, and for the acquisition of special proficiency in the various branches of medical art and science, which are enjoyed by the large number of younger resident practitioners who compose the staff of assistants. Positions on this staff are obtainable on conditions which may be easily satisfied by those who come properly accredited.

The Faculty have not relaxed their efforts to improve the equipment of the clinics and the laboratory.

Inquiries from many different places in a wide area evince the necessity of an institution for Post-Graduate instruction, and justify the anticipation that the labors of the Faculty will be even more extensively appreciated in the future than at present.

Respectfully submitted:

Leo Newmark,

Secretary Board of Trustees San Francisco Polyclinic.

REPORT OF THE DEAN OF THE COLLEGE OF DENTISTRY.

San Francisco, October 27, 1898.

To the President of the University,

Dear Sir:—I have the honor to make the following report of the condition of the College of Dentistry since the issuance of your last Biennial Report.

The prosperity of the College continues unabated, the attendance being about the same as stated in my last report; it was expected that there would be a great falling off on account of the stringency of the times, and the appearance of another dental school in this field. While I have no doubt that our attendance would have been greater in the absence of these conditions, still the fact that we have held our own is gratifying.

It is a source of satisfaction to report the general recognition of our increased standard of entrance requirements. At the opening of the present term, out of nearly sixty matriculates, only three were required to take the entrance examination, the others presenting certificates of exemption in accordance with our published requirement. It is a matter for congratulation that ours is the only school of this character in the country that has steadily maintained a rising standard, and in the face of this all our growth has taken place.

The ultimate hope is for a closer union with the University, and a standard of entrance requirements in keeping with such association. I have no doubt this will be attained as soon as all the professional departments are domiciled in the new College buildings on Parnassus Avenue.

Respectfully submitted:

L. L. Dunbar,

Dean.

REPORT OF THE DEAN OF THE COLLEGE OF PHARMACY.

San Francisco, October 27, 1898.

To the President of the University,

Dear Sir:—The number of students matriculated for the session of 1897 was 88, composed as follows:

Juniors,		Seniors,	
Men	42	Men	41
Women	2	Women	3
Total	44	Total	44

For the year 1898 the total number matriculated was 78, composed as follows:

Juniors,		Seniors,	
Men	28	Men	47
Women	1	Women	2
Total	29	Total	49

The number graduated in 1897 was 18: men, 17; women, 1. In 1898 the number graduated was 37: men, 36; women, 1. During the term of 1898 no fewer than eight students enlisted in the hospital corps of the United States Army—four from the Senior class and four from the Junior, for the most part being sent to Manila. Of these Seniors one only was graduated, the other three being unable to take the examinations before embarking for Manila.

The classes for the last year have been smaller than for a number of years previous. This falling off was chiefly due to three causes: first, the higher entrance requirements; second, the greater amount of time demanded by the curriculum, so that few students could earn any considerable portion of their expenses while at college; and third, the depressed condition of the retail drug business, by reason of which the prospect of finding remunerative occupation in pharmacy after graduation was lessened. The Directors and Faculty anticipated some falling off in numbers owing to the first two causes just mentioned. Nevertheless their ambition to keep the Department of Pharmacy fully abreast of the very best institutions of its kind in the country impelled them to extend the course of instruction, greatly increasing the laboratory work as well as some portions of the didactic teaching. In 1897 they added a course of lectures on Pharmacal Jurisprudence, and another on Physiology in Relation to the Action of Drugs. Both of these courses were enlarged in 1898, and a course of lectures on Physics was also added. These lectures, with the increase in laboratory work amounting to almost fifty per cent., necessarily added much to the expenses of the college, and as only a slight additional charge was made to the students, it was inevitable that the revenues should fall short of the expenditures. Every economy that could prudently be exercised was practiced in other matters. The results of these changes have been most satisfactory. The students who are offering themselves now come equipped with a better education, and make more satisfactory progress in their studies.

Heretofore the sessions of the College of Pharmacy have been carried on from spring to autumn, but the session of 1898–99 commenced in September, and will continue through the winter and spring months, thus bringing the close of the term at the same time as the other departments of the University. While there have been some advantages in having a summer course, it was frequently disappointing to us to see our students at the close of their junior year cross the continent to complete their course in an Eastern college that held its sessions in the winter. This unpleasant experience we shall no longer have to endure. One of those who were graduated in our last class has, however, gone to an Eastern college of pharmacy in order to take a post-graduate course. We hope to inaugurate such a course when we occupy our new quarters in the Affiliated Colleges Building, in which are laboratories specially intended for advanced work.

Reviewing the work of the past year, the result is, from an educational standpoint, most satisfactory. The interest and enthusiasm of the students is a gratifying indication that while our classes are smaller than they have been, yet the students appreciate the opportunities afforded them and are benefited accordingly.

Respectfully submitted:

W. M. SEARBY,
Dean.

REPORT OF THE SECRETARY OF THE FACULTY OF THE VETERINARY DEPARTMENT.

San Francisco, October 28, 1898.

To the President of the University,

Dear Sir:—In the year 1896, which was a hard story year for this department, our debt had become due, and although partly paid, our outlook was not good. We therefore called on the Faculty for monetary assistance, to which each member responded, and helped to tide over the difficulties of the institution.

During this year there were several resignations from the teaching staff, due in most cases to press of private business and lack of time to devote to the College.

The chief event of 1897 was the examination and graduation of our first class. Three students successfully passed the prescribed examinations, and were recommended to the University for and received the degree of Doctor of Veterinary Science (D.V. S.).

Several changes in the teaching staff occurred this year, due in part to removals from the city, in part to the fact that some of our instructors received appointments in the Bureau of Animal Industry. The chief change, however, was in chemistry. We found on the resignation of Dr. Goodman that it was impossible to get a competent teacher for any sum we could afford to pay. But through the kindness of the College of Pharmacy we have been able to send our students to their lectures on chemistry, at a nominal figure. This gives our students more chemistry than is required, but as we at present cannot do better, we have continued the arrangement for 1898.

During 1897 we received a benefit from the Ingleside Race Club of a day's racing, the returns to be divided between the College and the Balboa Boulevard Committee. This put the College on a somewhat better footing financially and allowed us to pay off all our over-due debts.

From fees the Department hardly does more than pay its rent and a few running expenses. It leaves nothing for the teaching staff or for advertising. If the institution were better known on this coast, or had an income from some other source, it would be better. Students are few, and there are two reasons for it. First, the College is not known or well advertised; and secondly, the degrees of Colleges with lower requirements are recognized in this State as on a par with the degrees of this Department.

In May, 1898, four students were, after passing the prescribed examinations, recommended for and received the degree of D.V. S.

It is very gratifying to note that, after two examinations have been held, the standing of our graduates is in every way creditable. Since our opening in 1894 twenty-one students have entered the College. Seven of these have successfully passed the prescribed examinations and obtained their degrees. Four of these graduates presented themselves and passed successfully the examination for the Bureau of Animal Industry. All four were appointed to different positions by the Bureau, and three still retain them.

The new College building is now about completed, but under our lease we cannot leave for a year to come (November, 1899). It would be useless for us as we stand to-day to enter our new building. Our equipment even in a moderate way would cost some five or ten thousand dollars. We might, if we could get some four or five thousand dollars, fit up our class rooms and dissecting room and hospital, and by making arrangements with the Medical Department for the use of their rooms for Bacteriology, Pathology, and Chemistry, we could gradually equip our other rooms. Some such arrangement will be necessary before we shall be able to occupy our new building. Our present equipment is only a makeshift at best, and is quite inadequate to our wants.

Respectfully submitted:

K. O. Steers,

Secretary of the Faculty.

REPORT OF THE UNIVERSITY LIBRARIAN.

Berkeley, July 1, 1898.

To the President of the University,

Dear Sir:—The course of the general library of the University during the past two years has been one of uninterrupted progress. By purchase and gift 7,490 bound volumes and 6,847 pamphlets were added; and, including certain uncatalogued recent accessions, there are over 76,000 volumes now on the shelves. Over 1,000 volumes have been added to the working, departmental collections. While we have experienced a healthy growth, it has been far from as rapid and symmetrical as is desirable. The demands of university study are ever more insistent, while our sole means of meeting them (the Reese fund) remains stationary. More than half of the accessions have been by gift, and these largely in special lines, so that several departments are actually weaker than they were two years ago when compared with others and with the ever-increasing output of the printing press.

The libraries of the larger Eastern institutions of learning are growing at a more rapid rate than our own. I feel confident, however, that, if our necessities could be brought in the right way to the attention of the generous-minded of our State, they would be fully supplied. The gift of smaller sums of from one thousand to twenty thousand dollars, the income only to be used for the purchase of books in single subjects, would materially help to solve the difficulty.

GIFTS.

Hundreds of single books, some of which are of much value, either commercial or educational or both, have been donated by as many individual friends, and the discreditably small amount of money at our disposal for book purchases has been supplemented by several donations of great importance.

From Mrs. Mary A. Avery came over three hundred books from the library of our distinguished fellow-citizen, Benjamin Parke Avery late Minister to China,—largely relating to *fine art*.

The Semitic library—aggregating about four thosand volumes—is the result of the generosity of Mr. Louis Sloss, Mr. Alfred Greenebaum, Rev. Dr. Voorsanger, and the ladies of Temple Emanu-El of San Francisco. Included are three valuable manuscripts, the rare Bomberg edition of the Talmud, costly dictionaries, scarce incunabula, and numerous standard works in Hebrew and Arabic linguistics, history, and divinity.

From Mr. C. P. Huntington came, as an especially choice gift, the Cowan collection of Californiana—600 bound volumes, 3,300 pamphlets, 12,000 pages of manuscript—of the greatest possible interest to the student of California history and literature. The unique manuscripts, including an almost unbroken line of documents signed by Spanish and Mexican governors, form the most precious portion. Somewhat extended notices of this gift appeared in the San Francisco *Chronicle* of July 13, 1897, and the New York *Evening Post* of August 23, 1897.

Important gifts were received from Mr. Samuel Putnam Avery of New York, Mr. John J. Valentine, Mr. Louis Janin, Hon. John Swett, and Mr. Edward Booth.

The graceful act of James K. Moffitt, a graduate of 1886, giving us one hundred dollars annually, for the purchase of recent literature, has resulted in the acquisition of many choice and useful works, and will undoubtedly prove suggestive to others of the alumni.

The *use of the Library* by students is now limited only by the floor space available for chairs and tables. The library is full of readers during the larger portion of the eight and three-quarters hours of the day; and the three hours in the evening are utilized by many students who lack leisure in the day. No statistics of circulation of books are kept, but one thousand volumes issued per week for home use would certainly be a fair estimate.

During the past four years a collection of writings by *Californian authors* has been set apart by itself, and every possible effort will be made to render it complete and keep it so. A large proportion of the books is enriched with autographs, autograph letters, inserted portraits, or biographical or critical notices. This collection comprises at present more than three thousand bound volumes, besides many hundreds of single essays, speeches, poetical effusions, etc., not yet catalogued. It illustrates fully the active and varied intellectual life of the commonwealth.

By means of the system of *inter-library loans*, approved by the Board of Regents, February, 1898, the University library is now in a position to loan books to any California public library and to over thirty large Eastern libraries, which have signified their willingness to reciprocate the favor. This means an extended enlargement and broadening of the library's field of usefulness, and especially in the direction of helpfulness to the people of California, whether they reside near the University or far away in some remote county.

For more detailed progress—reports about the Library, I beg to refer to the published Annual Reports of the Secretary of the University.

Respectfully submitted:

J. C. Rowell,

Librarian.

REPORT OF THE DEAN OF THE COLLEGE OF COMMERCE.

I. THE REASONS FOR ITS ESTABLISHMENT.

The increase in the number of seekers after a college education in California, during the past ten years, is a most astounding fact. Notwithstanding the establishment, under private patronage, of a second large and richly endowed university in the State, the attendance at the University of California has increased five-fold. It has far outstripped the growth of the State itself, the increase being four times as rapid as that of the population. One out of every forty of all the boys and girls in this State, old enough to go to college, is in the State University, and nearly as many more are at Stanford University and the other colleges in the State. Twenty-five or thirty years from now one person in every twenty-five living in California will be college-bred. In itself this is a most remarkable fact, which can be duplicated in few communities of like size and wealth.

No explanation for this phenomenal growth is adequate which overlooks the simple fact that the young men and women of the State find in the University and in the other colleges something which they believe is likely to prove helpful to them in life. Modern life requires of many people a higher training than was required in the past. And that requisite for success is being sought in the Universities. An increase in the number of those seeking a college education so vastly in excess of the increase of population can but signify that there are new spheres in life in which it is hoped to apply the learning of the schools. It is not so very long ago that the only spheres in life outside the academic halls in which a man could hope to apply a collegiate training were those of the parson, the doctor, or the lawyer These were *par excellence* the "learned professions." Upon the exalted position occupied by these professions, the engineer was the first to make vigorous assault. The application of science to many sides of human labor, the development of the means of transportation and of communication, to say nothing of the development of mining and the application of electricity—these and a thousand and one other things call for men learned in these new professions, if not men of "the learned professions." By degrees the colleges widened their curricula, giving to the engineer an opportunity to get his training within their doors. Now a new applicant for learning in his profession comes knocking at the doors of the college, and he is the merchant.

The calling of the merchant has long been an honorable one. Usually in wealth, and sometimes in political influence, the merchant has outranked the men of the so-called learned professions. In the past the successful pursuit of the career of the merchant has required more of practical experience than of scientific knowledge, and the colleges have had little to offer him. But owing to the great changes in the means of transportation, and owing to the application of science to so many sides of life, the merchant's work has changed and the preparation required is broader.

These facts are so often dwelt upon that it needs no multiplication of examples and no argument to demonstrate that the qualities of mind, and the knowledge required for the successful administration of commercial business under modern conditions, cannot be obtained from a study of the "three R's." The application to industry of the results of scientific investigations, which has been made upon so stupendous a scale during the last seventy-five years, has entirely changed the character of commerce. Markets which seventy-five years ago were restricted to a single town or village, are now world markets, and the modern trader who does not understand the conditions of the world market in which he must buy and sell his wares, is destined to failure.

To sum the whole matter up, commercial organization on a large scale is the order of the day; and the successful administration of the vast aggregations of capital, the buying and selling of goods in the world's markets under the conditions of world-wide competition, require the broadest mental training and the widest knowledge that can possibly be obtained. Therefore, once again the Universities are called upon to expand their courses. They must offer the merchant and business man a thorough training in the scientific principles underlying his profession. The things to be taught are more important than book-keeping and accounting. Every successful business man knows that his success has been in large measure due to his perception of certain fundamental principles, or truths, concerning the conditions under which his business has been transacted. He has had to learn these principles by costly experience, often he has been taught them by failure and loss. It is from just such principles of broadest application that the sciences dealing with the "ordinary business of life," as Professor Marshall calls them, are built up.

It is full time that the university courses of study be so broadened that the young man who intends to enter upon a business career may find a college training of the same practical value to him as that of the engineer, the physician or the lawyer.

Such, in a general way, is the significance and purpose of the establishment of a course of commercial studies at the University of California. It is the natural and logical outcome of the economic development of the country. Naturally it is the forerunner of many similar courses in different parts of the United States. But a few weeks after the announcement of the scope and purpose of our College of Commerce, and of the provisional arrangements for the commencement of instruction this year, the University of Chicago announced the establishment there of a college of similar scope and character. Columbia University has for some time had a similar plan under consideration. For years the University of Pennsylvania has had a School of Finance, on a much less comprehensive plan than our College of Commerce, but with a very similar purpose.

The new college does not find us wholly unprepared. For a long time past the University of California has been developing some of the most important of the courses of study to be included in this college. Thus we already have courses in Political Economy, in the History of Commerce and of Industry, in Transportation, in Banking and Currency, in Public Finance, and many allied subjects; in International Law and in Comparative Law; in the Modern Languages; in Navigation and Practical Astronomy; and in all the Technological Studies concerned with the Materials of Commerce. Recently courses in Geography have been added. It is now possible to obtain some instruction in almost all of the courses which should, theoretically, be embraced in such a college. In recognition of that fact, students have been allowed to enroll in the new college this year. But the college is by no means completely equipped. There are, fortunately, more than enough courses to keep a student busy with great profit to himself for the four or more years which he can devote to preparation for a mercantile career. But there is not that amplitude of choice which should be available. Instruction in many of the subjects now offered should be enlarged, existing courses subdivided, and the work intensified. Many new courses are required. We shall need museums and, also, correspondents in different parts of the world to gather information and statistics relating to the subjects studied. The corps of instructors and professors must be so enlarged that each one may devote a part of his time to original investigation and research in the subjects which he is to teach. No sciences are advancing more rapidly to-day than those "relating to the ordinary business of life." For doing the work which the community expects from the University our resources are far from adequate. The recent generous gifts will help to realize many of our hopes; but more, far more, will still be needed.

That this new movement in University growth began with the University of California seems to be remarkably significant. We are but just beginning to realize in a vague way the vast possibilities for commercial development which center around the Pacific Ocean. The location upon the shores of that ocean of the first real College of Commerce to be found in the United States seems, therefore, to have a peculiar appropriateness and a deep meaning for the future. Commerce in the future will be controlled and directed by the men of the broadest outlook and greatest powers of organization. What share of the commerce of the Pacific Ocean will pass through the ports of California will be decided by the enlightenment and wisdom of her merchants.

II. THE ORGANIZATION OF THE PROPOSED COURSE OF STUDY.

The College of Commerce is the ninth to be established in the University at Berkeley. The general form of organization for the University determined that of the new college. In order to make clear the position occupied by the College of Commerce it is necessary to explain briefly the organization and character of the older colleges.

The students of the University are grouped, according to the courses of study which they are pursuing, into various "colleges." The term "college" is used here in a somewhat unusual sense, but in one which is strictly in accordance with its proper meaning. It means a course of study leading to a degree. The different "colleges" are designated by names which indicate in each case the main constituents of the course. Thus we have the College of Letters, which gives a course of study corresponding to the so-called classical course of the leading American colleges, and in which the prescribed study of Greek and Latin is the distinguishing feature. This leads to the degree of A.B. Then there is the College of Social Sciences, in which the course of study follows the modern lines of liberal culture. It includes the languages, literature, history, and political science. It differs from the College of Letters mainly in that it omits Greek and does not insist on Latin, except for entrance. This course leads to the degree of B.L. This college is suitable for those who are preparing to study law, or to practice journalism, or for any career in which a knowledge of history and of economic and social science is likely to prove useful. There is also a College of Natural Sciences whose curriculum embraces the whole field of general science, together with the languages and arts necessary to the student and the investigator. This college leads to the degree of B.S. These three are known as the Colleges of General Culture, because in them a certain amount of work is prescribed with a view to the general information, discipline, and culture of the the student; and no student is allowed to specialize until he has laid a fairly broad foundation.

In addition to these there are five Colleges of Applied Science; these are the Colleges of Agriculture, Mechanics, Mining, Civil Engineering, and Chemistry. In these colleges special provision is made for the technical as well as for the general training of the student. The course in each of these colleges leads to the degee of B.S.

A student who enters the University chooses at the outset that one of these eight colleges which is best suited to his purpose. Thus one who wishes to enter a journalistic career, for example, would naturally enter the College of Social Sciences. Once within the college, however, he still has considerable latitude in the choice of his studies. That is, the would-be journalist may make the study of language, of rhetoric, and of literature the center of his course; or he may turn his attention mainly to history, politics, law, and economics. At the same time he is not allowed to become one-sided; for after he has chosen one of these sets of studies he is still required to take a certain amount of the other; but he is not allowed to take a little of this and a little of that and not enough of any one thing. He must take enough of one set of related subjects to prepare him to specialize in the line chosen.

For the granting of degrees, for the general arrangement of the studies, and for a number of other purposes, each of these colleges has a special Faculty, or group of Professors. But contrary to the common understanding of this term outside of the University, the faculty of one college may consist of the very same professors who are on the faculty of another college. Since the college is a course of study, all the professors who give instruction in that course are members of the faculty. Colleges differ from one another in the emphasis which they lay upon this or that subject. Hence it comes about that the faculties of colleges so fundamentally different as the College of Letters and the College of Social Sciences are composed of exactly the same persons. A student in Letters *must* take Greek and Latin, and a student of the Social Sciences *may* take these subjects, hence the professors of Greek and Latin are in both these colleges.

From this explanation of the existing organization of the University it should be clear how it was that the University could so readily expand to embrace a new college. Although, of course, it will be necessary to enlarge the corps of instructors in those departments which teach the subjects upon which most stress is laid in the new college, yet it was not necessary to collect an entirely new faculty; because, many of the subjects which would naturally belong to the course of study designated as the College of Commerce were already taught in the University. The students who enter the new college simply pass into the class-rooms with those of the other colleges who may be taking the same work. The difference is in the emphasis laid on the different subjects. There is no unnecessary duplication of work and, consequently, there is the greatest possible economy of effort.

Thus the College of Commerce slips readily into its place as the fourth of the Colleges of General Culture. At its head, as at the head of every other college, is the President of the University. It has a faculty composed of those professors who are giving instruction in the courses open to students who enroll in the college. That faculty chooses a dean to advise with and guide the students in the college, to take charge of certain matters of discipline, and to care for the special interests of the college. Every student and every professor in the College of Commerce is first a member of the University and after that a member of this college. The creation of a new college in the University of California is thus in some respects analogous to the admission of a new State into the Union. The citizens who compose the new State were, and remain, first and foremost, citizens of the United States, and are still subject to federal law. So a student in the new college is first and foremost a member of the University and is subject to all the general regulations.

What then constitutes the characteristic of the College of Commerce by which it is distinguished from the other colleges? What are the studies which the would-be merchant requires and which render necessary a new grouping of the courses of study in the form of a new college? The University of Chicago has answered this question by simply grouping together four departments and calling them the College of Commerce. These are the departments of Political Science,* of Political Economy,† of History, and of Sociology and Anthropology.

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*Political Science deals with constitutional law, and the general powers, forms, and activities of government.

†Political Economy treats of the production, distribution, exchange, and consumption of wealth; that is of all things bought and sold for money. It includes such subjects as currency and banking, industry, commerce and transportation, insurance, capital, labor, taxation, and the like.

The general plan and policy of the University of California does not, however, admit of such complete specialization. It is a question, much discussed among educators, how far it is safe to go in allowing students to specialize in their undergraduate work. Our faculty has taken the conservative view. For many years this University has insisted upon the necessity for a certain amount of breadth and culture in all its courses, no matter how technical they may be. The character of the new college at Chicago is not very unlike that of our College of Social Sciences, with the omission of those studies which are retained by us for the sake of culture and breadth; that is, a certain amount of language and of literature, of mathematics and of science.

But although the course of study designated by the University of Chicago as the College of Commerce is not in accord with our accepted policy, it nevertheless includes the subjects which should form one of the central parts of the course in a true College of Commerce.

Commerce is the exchange of wares on a large scale between places and communities, and political economy has frequently been defined as the science of exchange. It is certainly the one science which is intimately concerned with the principles underlying industry and commerce; the only science which investigates the "ordinary business of life" from every side. It is certainly an essential part in the course of commerce. A College of Commerce which allowed any student to graduate without at least an elementary knowledge of economics and finance would not be worthy of the name.

Somewhat less intimately, but still very closely, related to commerce stands the group of political sciences and history. The merchant must understand something of the political institutions of the countries in which he trades. He must know something of mercantile law, and of the laws relating to property and its transfer, in different countries. All of these things are easier to understand if he also knows something of history.

While these subjects logically and necessarily constitute one of the characteristic parts of the course, yet there is another side to Commerce. There is another set of sciences which embody general principles underlying this department of human activity. While the sciences directly concerned with commerce are mainly social sciences, inasmuch as commerce is the interchange of commodities between the members of society, yet the merchant cannot ignore a number of natural sciences. Commerce has always reached out into the uttermost parts of the earth, and geography is one of her first handmaids. The transportation of commodities, and the manufacture of the materials with which commerce deals, are two of the most important fields for the application of science. Hence a true College of Commerce must necessarily afford instruction in geography, and in a considerable number of the so-called technical sciences, or applied sciences.

There are, therefore, clearly two sides, at least, to the ideal course in commerce. On the one side it presents all those sciences dealing with the principles and practice of exchange, while on the other it presents all those sciences dealing with transportation and with the materials of commerce or the wares to be exchanged. In most cases the student will desire to devote his attention to but one side of the course, and will choose that which is best adapted to his purpose. But no student should be allowed to confine his attention exclusively to one side. It would, as has just been suggested, be absurd to allow a student to graduate in this college who has neglected the science of exchange, and it would be equally absurd to allow him to neglect entirely such subjects as navigation and geography, and those technical sciences which treat of the wares in which he intends to deal. Every student must be required to take some of each of those two diverging groups of studies, but he should be allowed to take more of the one or of the other according to the particular kind of commercial activity he intends to pursue.

These strictly commercial studies, forming the central or characteristic part of the course, may then be supplemented by the languages and literatures of the countries with which we have commercial relations. The recent establishment of a chair for instruction in the business language of China practically completes the list of necessary languages.

The following list of courses taken from a prospectus recently issued by the University will show more clearly the intended scope and character of the new college:

Economic Studies: General Theory and Analysis:—

Political Economy: General Principles and Theory.
Labor and Wages.
Theory and Practice of Exchange; foreign and domestic.
Theory of Value.
Markets: their organization and the determination of prices.
Currency: in all countries.
Banking: in all countries.
Economic features of Transportation, by land and water. (A subject in which many special courses should be offered.)
Industrial and Commercial Organization.
Corporations and Corporation Finance.
Communication: postal service, telegraph and telephone, newspapers and advertising.

Insurance: Fire, Marine, Life, etc.
Consumption, and the principles of Demand and Storage.
Commercial Usages of different Countries.
Public Finance: Government expenditures, revenues,—including taxation, customs duties, etc.,—public debts, and fiscal administration.
Statistics, mathematical and practical. History, theory, and methods: the "movement of population," actuaries' statistics, theory of prices, etc.

Studies in Economic History:—

The History of Commerce in all countries and at every age. (Upon this general subject as large a number of special courses as possible should be offered.)
The History of the Institution of Private Property.
The History of Land Tenures.
The History of Agriculture.
The History of Industry from the earliest times.
The History of Manufactures.
The History of Labor and of Labor Organizations, and other special courses.

Legal Studies:—

Commercial Law of different Nations.
Public International Law, and the duties of Diplomatic and Consular Officers.
Private International Law.
Admiralty and Maritime Law.
Roman Law.
Comparative Jurisprudence.
Judicial Procedure in different Countries.
Law of Private Corporations; and other special courses.

Political Studies:—

Constitutional Law of different Nations.
Public Law and Administration.
Municipal Government.
General Political Theory.
Legislative Control of Industry and Commerce.

Historical Studies:—

The general political and constitutional history of the leading nations, especially during the XIXth Century; diplomatic history. (Economic history, that is the history of Industry and Commerce, is of such importance as to constitute a separate group; see above.)

Geographical Studies:—

Political Geography.
Geodesy.
Physical Geography.
Commercial Geography.
Biological Geography: including Botany, Zoölogy, Anthropology, etc.
Meteorology and Climatology.
Oceanography: Coasts, Harbors, etc.
Navigation and Nautical Astronomy.
Geology.

Technological Studies concerning Transportation:—

Civil Engineering and Mechanical Engineering; construction of roads, bridges, canals, irrigation works, etc.; motors and motive power, etc.; railroad economics, etc.

Technological Studies concerning the Materials of Commerce.—

Botany: General Plant Morphology; and Economic Botany.
Forestry, and wild-plant products; also wild-animal products.
Agriculture: cultivated plant products of all descriptions, including field, orchard, and vineyard products; animal products, such as meats, dairy products, wool, etc., and including agricultural practice, irrigation, etc.
Agricultural Manufactures, such as sugar, starch, textiles, oils, brewing, tanning, drying, canning, etc.
Fisheries, and all the products of the sea.
Mining, and mineral products, and building materials.
Chemical Technology, and chemical products, acids, alkalies, etc.
Manufactured Products.
Decorative and Industrial Art.

A large number of other special courses in these and other applied sciences connected with the materials and the operations of Commerce should be offered.

Mathematical Studies:—

Courses covering all the mathematical principles involved in the above studies.

Linguistic Studies:—

The English Language and English Literature.
The languages and literatures of the nations with which we have commercial relations: American, European, and Oriental.

Philosophical Studies:—

Ethics and Civil Polity.

Connected with the college there should be a commercial museum exhibiting and illustrating the raw materials, manufactured wares, and in general the industrial and commercial appliances, products, and customs of different nations.

As a practical course it is desirable that students be required or encouraged to spend one or more years in some foreign country, in order to become thoroughly familiar with its commercial and industrial conditions.

Besides giving instruction in the courses above outlined, it is hoped that eventually the college may carry on continuous investigations in all the movements of trade; in transportation, communication, exchange, finance, banking, and insurance; in markets, products, and prices; in short, in all the conditions, legal, political, economical, and physical, upon which trade depends. The results of these general investigations should be published for the use of the community, and special investigations should be made from time to time in response to the demands of the community.

Such in a broad general way is the ideal of the new college which has been established in the University of California.

Although instruction has been begun during the present academic year, there are many details yet to be determined. It has not yet been decided what degree should be bestowed upon the graduates of the college.

It is the intention of the authorities of the University to keep the course in commerce upon a high scientific plane. Otherwise it is not justified in claiming a place in the University curriculum, beside those advanced scientific, philosophical, and literary courses which have already won recognition. The sciences dealing with the various departments of the world's trade can justly claim such recognition. The mere arts of the counting-room do not belong to the list of studies. The student will be encouraged to acquire a knowledge of them elsewhere, possibly before entering college. Thus the College of Commerce will supplement, not compete with, the work of the older business and commercial schools. It is not by their skill as bookkeepers that the merchant princes have won their title to fortune and to fame. They have been men who could see beyond the pages of their ledgers, and who understood something of the nature of the great forces which govern the commerce of the world.

In this departure the University of California has undertaken a great work that is to develop a higher course of study, at once liberal and practical, which will meet the needs of the coming generation of business men. That work is particularly necessary at this time and at this place, for "he who runs may read" in the signs of the times that the commerce of the Pacific will soon be revolutionized. The present resources of the University are far from adequate for the complete equipment of the new college. For the successful prosecution of this great work the University must have the full sympathy and support of the business community.

Respectfully submitted:

Carl C. Plehn,

Dean, *pro tem.*

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ARTHUR C. ALEXANDER, Ph.D.,

Instructor in Physics.

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Assistant Astronomer (L.O.)

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WM. B. BOSLEY, A.B., LL.B.,

First Assistant Professor of Law (L).

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W. P. BOYNTON, Ph.D.,

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CORNELIUS B. BRADLEY, A.M.,

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ELMER E. BROWN, Ph.D.,

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GEORGE E. COLBY, Ph.B., M.S.,

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A J. COOK,

Conductor of Farmers' Institutes for Southern California.

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GEORGE DAVIDSON, Ph.D., Sc.D.,

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President of the University.

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GENEVRA EVO MAGEE,

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E. J. WILCZYNSKI, PH.D.,

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STATISTICAL ADDENDA COMPILED BY THE RECORDER OF THE FACULTIES.

ENROLLMENT IN THE COURSES OF INSTRUCTION

OFFERRED IN THE COLLEGES AT BERKELEY,

1896-97 and 1897-98.

Note.—A dotted line appears in the column headed "No. of Students" when a course was *not given;* an unbroken line in that column indicates that the enrollment was not reported.

Instructor	Title of Course	No. of Units a Week		No. of Students in Attendance	
		One Half-Year	One Year	1896–97	1897–98
	PHILOSOPHY.				
Howison; Stratton; McGilvary; Bakewell	1. Formal Logic	4	....	79	97
Howison; Stratton; Bakewell	2. Elementary Psychology	4	....	49	40
Stratton	2A. General Psychology	2	....	43	....
Stratton	2A. General Psychology	3	....	....	21
Howison; Bakewell	3. Introduction to Philosophy	4	....	18	22
Howison	4. Elementary Ethics, including Civil Polity	....	2	17	....
Howison; Bakewell	4. Elementary Ethics, including Civil Polity	....	4	....	10
Howison	5. The Philosophy of Kant	....	2	14	7
Stratton	6. Introductory Experimental Psychology	4	....	....	15
Howison	7. The Philosophy of Plato	....	2	3	....
Howison	8. Hegel's Logic	....	4	1	5
Howison	9. Teachers' Course	....	2	....	....
McGilvary	10. Inductive Logic	4	....	5	....
McGilvary	10. Inductive Logic	....	2	....	7
McGilvary	11. Advanced General Logic	....	2*	6	4
McGilvary	12. Hume and Kant	4	....	6	2
Stratton	13. Psychological Conference	2	....	....	7
Stratton	14. Psychological Laboratory: Elementary	4	....	....	....
Stratton	15. Psychological Laboratory: Advanced	....	5	....	....
Bakewell	16. Plato and Aristotle	4	....	....	....
Bakewell	17. Scholastic Philosophy	4	....	....	....
Bakewell	17A. Recent French Philosophy	....	2	....	3

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* Beginning in January, 1897.

ENROLLMENT IN THE COURSES OF INSTRUCTION—*(Continued)*.

INSTRUCTOR	TITLE OF COURSE	NO. OF UNITS A WEEK		NO. OF STUDENTS IN ATTENDANCE	
		One Half-Year	One Year	1896–97	1897–98
	PEDAGOGY.				
Brown; Dunn	1. The Practice of Teaching	4		36	
Dresslar; Heaton	1. The Practice of Teaching	4 or 5			56
Bailey; Dresslar; Heaton	2A. School Supervision	2		74	29
Bailey; Dresslar; Heaton	2B. Visitation of Schools	1		15	6
Bailey	3. The History of Education: Ancient Educational Ideals	3		123	89
Bailey	4. The History of Education: Modern Educational Ideals	3		121	
Brown	5. Theory of Education	4		67	28
Brown	6. School Systems	2		51	61
Brown	7A. Seminary	2		16	14
Brown	7B. Seminary	2		13	8
Bailey	8. Graduate Seminary			19	5
Bailey	9. Biological Aspects of Education	2		8	
Bailey	9. The Development of Character		3		3
Dresslar	10A. Introduction to Pedagogy	3			116
Dresslar; Heaton	10B. Visitation of Schools	1			31
Dresslar	11A. Seminary	2			13
Dresslar	11B. Seminary	2			7
Dresslar	12. School Hygiene	2			72
Brown	13A. Studies in Secondary Education	2			62
Brown	13B. Visitation of Secondary Schools	1			10
Bailey	14. Introduction to Ethology	2			93
	JURISPRUDENCE.				
Jones	1. Formation of the Federal Constitution (First half)	1		13	18
Jones	1. Formation of the Federal Constitution (Second half)	1		31	27
Jones	2. Constitutional Law of the United States		2	49	
Jones	2. Constitutional Law of the United States		3		30
Jones; Hengstler	3. Principles of International Law	2		28	14
Jones	4. History of International Law	2		8	
Jones	5. Roman Law	4		33	
Jones	5. Roman Law (First half)	3			25
Jones	5. Roman Law (Second half)	2			25
Jones	6. Studies in Comparative Law		2		
Jones	7. Principles of Jurisprudence	4		30	

ENROLLMENT IN THE COURSES OF INSTRUCTION—*(Continued)*.

INSTRUCTOR	TITLE OF COURSE	NO. OF UNITS A WEEK		NO. OF STUDENTS IN ATTENDANCE	
		One Half-Year	One Year	1896–97	1897–98
Jones	7. Principles of Jurisprudence	2			18
Jones	8. Roman Law of Contracts	2		4	
Jones	8. Roman Law of Contracts	1			22
Gutsch	9. History of Modern European Codification	1			18
	HISTORY AND POLITICAL SCIENCE.				
Day; Babcock	1. History of Europe during the Middle Ages	4		153	
Bacon; Babcock	2. Constitutional History of England	4			
Bacon	3. History of Europe from the Reformation to the French Revolution (First half)	4		62	
Bacon; Babcock	3. History of Europe from the Reformation to the French Revolution (Second half)	4		135	
Bacon	4. Political History of the Nineteenth Century	4		57	
Babcock	5. History of the United States (First half)	4		32	
Babcock	5. History of the United States (Second half)	4		26	
Day	6. History of the United States	4		16	
Plehn	7. Elementary Political Economy (First half)	4		81	
Plehn	7. Elementary Political Economy (Second half)	4		26	
Bacon	8. Comparative Constitutional Law	4		43	
Moses	9. Spanish-American History and Institutions	2		15	
Day	10. History of Greece	4		23	
Day	11. History of Rome	4		23	
Plehn	12. Economic History	4		54	
Plehn	13. Local Government and Administration	4		28	
Plehn	14. Finance and Taxation	4		43	
Moses	15. Economic Theory	4		22	
Moses	16. History of Political Theories	4		26	
Moses	17. Political Science	2		13	
Moses	18. Theories of Social Progress	2			
Bacon	21. The History of the Christian Church		2	4	
Plehn	22. Statistics	2		3	
Moses	23. Territorial Expansion of the United States	2		8	
Moses	24. Economic Condition of Laborers in England	2		1	

ENROLLMENT IN THE COURSES OF INSTRUCTION—*(Continued)*.

INSTRUCTOR	TITLE OF COURSE	NO. OF UNITS A WEEK		NO. OF STUDENTS IN ATTENDANCE	
		One Half-Year	One Year	1896–97	1897–98
Day; Babcock	1A. Introduction to History and Economics (First half)	4			119
Day; Babcock	1A. Introduction to History and Economics (Second half)	4			64
Leach	2A. History of the French Monarchy (First half)	4			37
Leach	2A. History of the French Monarchy (Second half)	4			67
Bacon	3A. The French Revolution	4			43
Bacon	4. Europe in the Nineteenth Century	4			91
Leach	5A. History of England to the Petition of Right	4			12
Leach	6A. History of Modern England	4			20
Plehn	7. Economics	4			95
Babcock	5. The English Colonies in America	4			12
Babcock	6. The United States under the Constitution	4			25
Moses	23. Territorial Expansion of the United States	2			11
Day	8A. Economic History of the United States	4			40
Babcock	9A. The Holy Roman Empire	4			22
Bacon	10A. The Renaissance and Reformation	4			25
Bacon	8. Comparative Constitutional Law	4			38
Moses	9. Spanish-American History and Institutions	2			29
Day	11A. Ancient History	4			
Day	12A. Economic History to 1763	4			5
Plehn	12B. Economic History since 1763	4			25
	13. Local Government and Administration	4			
Plehn	16A. Banking and Currency	2			40
Plehn	14. Public Finance	4			30
Plehn	22. Statistics	2			
Moses	15. Economic Theory	4			19
Moses	16. History of Political Theories	4			38
Moses	17. Political Science	2			11
Moses	18. Theories of Social Progress	2			
Bacon	21. History of the Christian Church		2		
Bacon	42. History of Eastern Christendom		2		4
Plehn	26. Federal Expenditures, Revenues and Debts		2		3
Plehn	27. Industrial and Commercial History of the United States		2		

Enrollment in the Courses of Instruction—*(Continued)*.

Instructor	Title of Course	No. of Units a Week		No. of Students in Attendance	
		One Half-Year	One Year	1896–97	1897–98
Plehn	28. Currency and Banking		2		
Babcock	29. Investigation Course in the History of the United States		2		1
Moses	24. Economic Condition of Laborers in England	2			
All members of the Department	44. Lectures on History and Political Science		1		30
	Semitic Languages and Literatures.				
Voorsanger	1. Hebrew		3	1	
Voorsanger	2. Hebrew	2			
Voorsanger	3. Aramaic	1			
Margolis	1. Biblical Hebrew: Elementary Course	3			4
Margolis	2. Biblical Hebrew: Samuel	3			8
Voorsanger	3. Biblical Hebrew: Interpretation of the Book of Isaiah	2			4
Margolis	4. The History of the Canon and Text of the Old Testament		1		2
Margolis	4a. Advanced Hebrew Grammar	1			—
Voorsanger	5. Rabbinical Hebrew: Pirque Aboth	2			4
Voorsanger	6. Rabbinical Hebrew: Selected Readings	2			2
Voorsanger	7. Biblical and Targumic Aramaic	2			
Margolis	8. Syriac: First Course	1			1
Margolis	9. Arabic: Elementary Course	2			2
Margolis	10. Arabic: Second Course		2		1
Voorsanger	11. General History of the Semitic Peoples		2		5
Voorsanger	12. Hebrew Prose		1		—
	Oriental Languages and Literatures.				
Fryer	1. The Languages, Literature, History, Government and Social Condition of China and Japan	2			12
Fryer	2. The Philosophies and Religions of China and Japan	3		5	
Fryer	2. The Philosophies and Religions of China and Japan	2			27

Enrollment in the Courses of Instruction—*(Continued).*

Instructor	Title of Course	No. of Units a Week		No. of Students in Attendance	
		One Half-Year	One Year	1896–97	1897–98
Fryer	3. Elementary Study of the Kuan-hua, the Official Spoken Language of China	...	3	9	7
Fryer	4. Advanced Study of the Kuan-hua, the Official Spoken Language of China	...	3	...	3
Fryer	5. Elementary Study of the Wen-li, the Classical Language of China and Japan	...	3	...	...
Fryer	6. Advanced Study of the Wen-li, the Classical Language of China and Japan	...	3	...	...
	GREEK.				
Flagg; Nutting	1. Twelve Books of Homer	3	...	59	71
Clapp; Nutting; Allen	2. Herodotus and Plato's Apology	3	...	54	63
Clapp; Flagg	3A. Greek Composition	...	1	7	...
Clapp	3A. The Crito of Plato	1	...	...	22
Nutting; Allen	3B. The Crito of Plato	1	...	19	9
Clapp	4. Introduction to Greek Tragedy	3	...	24	33
Clapp	5. The Iphigenia Among the Taurians of Euripides; and the Philippics of Demosthenes	3	...	16	...
Flagg	5. The Persians of Æschylus the Medea of Euripides and the Philippics of Demosthenes	3	...	...	25
...	6. Introduction to Classical Philology	1	...	...	...
Flagg	6A. Greek Composition	1	...	...	17
Clapp	10A. The Gorgias of Plato	2	...	...	21
Flagg	11A. Selected Orations of Lysias, and the Olynthiacs and the Oration on the Chersonese of Demosthenes	2	...	...	15
Clapp	12A. The Nicomachean Ethics of Aristotle	2	...	...	21
Flagg	13A. The Medea, Hercules Furens, and Heracleidae of Euripides	2	...	...	15
Flagg	14. Thucydides, Book IV	2	...	20	...
Flagg	15. The Oedipus at Colonus of Sophocles	2	...	10	...
Flagg	16. The Phaedo of Plato	2	...	19	...

ENROLLMENT IN THE COURSES OF INSTRUCTION—*(Continued)*.

INSTRUCTOR	TITLE OF COURSE	NO. OF UNITS A WEEK		NO. OF STUDENTS IN ATTENDANCE	
		One Half-Year	One Year	1896–97	1897–98
Flagg	17. Selected Idylls of Theocritus, with parallel readings from Virgil	2		8	
Flagg	18. Studies in Greek Syntax and Idiom, with comparison of the Latin [entered also under Latin]		1	3	
Flagg	18A. Comparative Syntax and Idiom of Greek and Latin [entered also under Latin]		1		4
Clapp	30. The Odes and Fragments of Pindar	4		5	
Clapp	30A. The Republic of Plato		4		3
Flagg	31. Sophocles				
Clapp	31A. Studies in Homer	4		5	
Flagg	32. The Plays and Fragments of Sophocles				
Clapp	33. The Plays and Fragments of Æschylus				
	Sanskrit.				
Nutting	36. Elementary Sanskrit				3
	LATIN.				
Rockwell; Price; Gleason	1. Cicero. Roman Life from the Sources	3		150	
Rockwell; Price; Richardson	1. Cicero and Pliny	3			181
Rockwell; Price; Gleason	2. Livy and Gellius	3		126	
Rockwell; Price; Richardson	2. Livy and Plautus	3			152
Price; Jones	3. Latin Composition, I		1	92	114
Rockwell; Gleason; Jones	4. Latin Composition, II		1	54	57
Price; Richardson	5. Horace	3		69	88
Richardson	6. Terence	2			
Price	7. Tacitus, Germania and Agricola; Ovid, Metamorphoses	2		49	57
Richardson	8. Selected Letters of Cicero	2			30
Merrill	10. Horace, Satires	2		11	
Richardson	11. Cicero, Brutus, Tacitus, Dialogus	2			
Merrill	11B. Cicero, De Legibus; Roman Constitutional Law	2		13	
Rockwell; Richardson	12. Latin Composition, III		1	20	23
Rockwell; Richardson	13. Latin Composition, IV		1	4	6
Price	14. Tacitus, Dialogus	1		19	
Price	14A. Horace, Satires	1			33

ENROLLMENT IN THE COURSES OF INSTRUCTION—*(Continued)*.

INSTRUCTOR	TITLE OF COURSE	NO. OF UNITS A WEEK		NO. OF STUDENTS IN ATTENDANCE	
		One Half-Year	One Year	1896–97	1897–98
Flagg	15. Roman Elegy; Tibullus and Propertius	3			16
Merrill	16. Ovid, Fasti	3		46	
Flagg	17. Virgil, Georgics	3			22
Merrill	19. Patristic Latin	3			36
Merrill	20. Martial	3		33	
Merrill	21. Juristic Latin	2		7	
Merrill	22. Roman Literature	3			9
Price	23. Tacitus, Annals; Seneca, Epistles	3			45
Merrill	24. Early Latin	3			52
Flagg	25. Lucretius; Cicero, De Natura Deorum		2	37	
Merrill	26. Quintilian, Books X and XII; Aulus Gellius	2			40
Flagg	27. Studies in Latin Syntax and Idiom compared with the Greek. (Also entered under Greek.)		1		4
Rockwell	51. Introduction to Greek Sculpture	2			
Rockwell	52. Roman Sources for the History of Art	2			4
Rockwell	53. The Private Life of the Ancient Romans		2	26	
Rockwell	54. Topography and Monuments of Ancient Rome	2			8
Rockwell	55. Petronius, Martial	2			
Flagg; Richardson	30. Latin Verse Composition		1	2	2
Flagg	32. Greek and Roman Bucolic Poetry	2		1	
Merrill	33. Cicero, De Finibus	3			
Merrill	34. Latin Seminary		3	8	6
Merrill	36. Ancient Italian Dialects	2		1	
Merrill	37. Catullus	3			
	ENGLISH.				
Armes; Syle; Sanford; Hart; Flaherty	1. Types of English Prose Style		3	432	311
Sanford	1A. Types of English Prose Style		3		33
Bradley; Armes; Sanford	2. General History of English Literature		3	172	183
Syle	3A. Composition	2		37	43
Syle	3B. Composition	2		21	30
Sanford; Hart	4A. Short Course in the History of English Literature. Beowulf to Milton	2		21	36
Sanford; Hart	4B. Short Course in the History of English Literature. Milton to Tennyson	2		18	40

ENROLLMENT IN THE COURSES OF INSTRUCTION—*(Continued)*.

INSTRUCTOR	TITLE OF COURSE	NO. OF UNITS A WEEK		NO. OF STUDENTS IN ATTENDANCE	
		One Half-Year	One Year	1896–97	1897–98
Lange; Hart	5A. Elementary Old English		2	95	98
Lange	5B. Germanic Sources of English Life and Culture	1			
Lange	6. Exposition	3		23	
Lange	6A. Introduction to the Advanced Study of English	1			101
Lange	6B. Exposition	2			36
Gayley; Flaherty	7A. Argumentation	2		48	24
Gayley; Flaherty	7B. Forensics	2		35	12
Flaherty	7C. Masterpieces of Argumentation	1		19	
Flaherty	7C. Masterpieces of Argumentation		2		
Lange	8. Poetics	2		79	97
Gayley	9. Problems of Literary Criticism	3			
Bradley	10. Frequent and Rapid Writing	2		7	
Lange	12. Advanced Old English	2		19	27
Lange	13. Chaucer	2		20	27
Bradley	14. English Grammar	3		4	9
Sanford	15A. Elizabethan Literature	3			19
Sanford	15B. Spenser and the Spenserians	3			23
Armes	16A. History of the English Drama	3		38	28
Armes	16B. History of the English Drama. (Continuation of 16A.)	3		25	14
Gayley	17A. Shakespeare	2		83	46
Gayley	17B. Shakespearian Tragedy	2		37	
Bradley	18. Milton's Poems	3			47
Syle	19A. English Literature of the Eighteenth Century. The Prose Writers	3		39	43
Syle	19B. English Literature of the Eighteenth Century. The Poets	3		25	47
Sanford	20. English Liberal and Romantic Movement		3	16	8
Gayley	21. The History of Poetry in the Nineteenth Century	2		109	
Gayley	22. Wordsworth and Browning	3		41	
Armes	22A. Browning	2			12
Bradley	23. Study of an Author	2		20	15
Lange	25. Special Studies in English Philology		2	5	
Lange	25. Special Studies in English Philology		1	4	
Lange	26. The Influence of Germany on English Literature		2		
Bradley	27. The Mediæval Spirit as Related to Art		3		
Bradley	28. The Essay		3	10	

ENROLLMENT IN THE COURSES OF INSTRUCTION—*(Continued)*.

INSTRUCTOR	TITLE OF COURSE	NO. OF UNITS A WEEK		NO. OF STUDENTS IN ATTENDANCE	
		One Half-Year	One Year	1896–97	1897–98
Bradley	28. The Essay				8
Gayley	30. The History of Literary Criticism		2 3		
Gayley	31. English Comedy		3	18	
	33. Special Study			2	4
Bradley	33B. Introduction to Mediæval Life and Ideals		2		8
	GERMAN.				
Putzker; Senger; Wharff; Centner	1. Introductory Course		4	180	160
Centner	1B. Introduction to Scientific German		3		10
Lange; Centner	1A. German Prose		4	21	18
Putzker; Wharff	2. Schiller		4	114	118
Senger	3. Scientific German		3	31	38
Senger	4. Goethe		3	51	58
Putzker	5. Lessing		3	31	30
Senger	6. Composition and Conversation		2	8	
Centner	6. Higher Composition		2		11
Senger	7. Middle High German and Old High German	2		6	
Senger	7. Middle High German and Old High German	3			21
Senger	8. Gothic	2		3	
Senger	8. Gothic	3			8
Putzker	9. German Literature		5	7	
Putzker	9. Goethe's Faust		2		6
Putzker	10. German Lyric Poets of the Nineteenth Century		3	15	
Putzker	10. German Lyric Poets of the Nineteenth Century		2		10
	11. History of the German Language		3		
Wharff	11. History of the German Language		2		
Senger	12. Historical German Grammar		3	1	
Senger	12. Historical German Grammar		2		
Wharff	13. Difficult Prose		3		4
Wharff	14. German Classic Writers of the Middle Ages		3		2
Senger	15. The Romantic School		3		12
	16. Special Study				
	ROMANCE LANGUAGES.				
	French.				
Howard; Moran; Bartlett	1. Introductory Course		4	156	143
Chambers	1A. Scientific French		3		6
Faucheux	2. Scientific and Literary French Prose		2	35	

ENROLLMENT IN THE COURSES OF INSTRUCTION—*(Continued)*.

INSTRUCTOR	TITLE OF COURSE	NO. OF UNITS A WEEK		NO. OF STUDENTS IN ATTENDANCE	
		One Half-Year	One Year	1896–97	1897–98
Faucheux	2A. Scientific French Prose		2		20
Chambers	2B. Literary French Prose		2		47
Howard; Faucheux; Moran; Chambers	3. Prosper Merrimée's Colomba		1	80	117
Paget	4. French Drama		2	103	96
Howard	5. French Composition		1	18	13
Howard; Faucheux; Chambers	5A. Conversational French		2		38
Faucheux; Chambers	6. Critical Readings from the Poets of the Romantic School		2	21	19
Faucheux	7. An Elementary Course in the History of French Literature		2	27	25
Paget	8. General Studies in Mediæval Literature		1	32	
Paget; Chambers	9. Literature of the Sixteenth Century		1		7
Paget; Faucheux	10. Literature of the First Half of the Seventeenth Century		1		16
Paget	11. Literature of the Second Half of the Seventeenth Century		1		
Paget	12. Literature of the Eighteenth Century		1		23
Paget	13. Victor Hugo's Prose		2	59	76
Faucheux	14. Victor Hugo's Poetry		2	16	15
Howard	14A. A Comparative Study of English and French Constructions and Idioms		1		2
Paget	15. The Romantic School		1		
Paget	16. The Realistic School		1	10	
Paget	17. Poets and Novelists of the Latter Part of the Nineteenth Century		1		9
	Spanish.				
Howard	18. Grammar		3	19	18
Paget	19. Spanish Drama		1	15	
Howard	19A. Advanced Grammar and Conversational Spanish		1		17
Faucheux	19B. Modern Spanish Fiction		2		14
Paget	19C. Don Quijote and Spanish Drama		2		7
Faucheux	20. Don Quijote		2	20	
	Italian.				
Moran	21. Grammar and Modern Italian		3	6	
Chambers	21. Grammar		3		3
	22. Leopardi	3			

ENROLLMENT IN THE COURSES OF INSTRUCTION—*(Continued)*.

INSTRUCTOR	TITLE OF COURSE	NO. OF UNITS A WEEK		NO. OF STUDENTS IN ATTENDANCE	
		One Half-Year	One Year	1896–97	1897–98
	23. Petrarch	3			
Paget	24. Dante's La Divina Comedia		2	6	5
Chambers	24A. Modern Italian Fiction		1		3
Faucheux	25. Old French		2	4	5
Paget	25A. French Literature of the Ninteenth Century		2		
Paget	26. Romance Philology. A comparative study of the Principal Romance Languages		4	6	8
Paget	27. French Literature of the Nineteenth Century		1	6	
Paget	32. Romance Philology				
	DECORATIVE AND INDUSTRIAL ART.				
Ardley; Winterburn	1. Elementary Drawing	1		102	
Winterburn	1. Elementary Drawing		1		96
Ardley; Winterburn	1A. Elementary Drawing		2	16	
Ardley	2. Cast Drawing		2	23	
Yelland	2. Charcoal Drawing		2		20
Ardley	3. Advanced Drawing. Study of the Antique in crayon and charcoal		2	15	
Yelland	3. Cast Drawing		2		21
Ardley; Yelland	4. Advanced Drawing. Study of historic ornament and the human figure		2		15
Ardley; Yelland	5. Antique Drawing		2		
Ardley	6. Ancient Art	1			23
Ardley; Winterburn	7. Geometric Design	4		13	23
Ardley	8. Plant Analysis	2		13	22
Ardley	9. Historic Ornament	2		7	17
Ardley	10. Ornamental Design	4		7	19
Ardley	11. Applied Art		4	9	6
Ardley	12. Applied Art (advanced)		4		9
Ardley	13. Industrial Art Work		2		
Ardley	13. Wood Carving		2		12
Ardley	14. Advanced Carving		2		
	15. Clay Modeling		2		
Ardley	16. Ancient Art	1		5	
Ardley	16. Art Furniture		2		
Ardley	17. Historic Design		2		
Ardley	18. Antique and Life Drawing		2		
	18. Ceramics		2		
Ardley	21. Historic Design		2		
Ardley	22. Life Class		2		
	MATHEMATICS.				
Edwards; Haskell; Hengstler	1. Algebra		2	281	
Hengstler; Pierce; Noble; Dickson	1A. Algebra	2			244

ENROLLMENT IN THE COURSES OF INSTRUCTION—*(Continued)*.

Instructor	Title of Course	No. of Units a Week		No. of Students in Attendance	
		One Half-Year	One Year	1896–97	1897–98
Perry	1A. Algebra	2			68
Pierce; Perry	1B. Algebra		2*	58	58
Hengstler; Pierce; Dickson; Perry	1C. Algebra	2			37
Stringham	2. The Language and Method of Mathematics		2	51	
Stringham	2. Elements of Analysis		2		46
Edwards; Haskell	3A. Elements of Analysis, with Applications		5	119	132
Edwards; Haskell; Noble; Perry	3B. Elements of Analysis, with Applications		3	80	74
Hengstler; Pierce; Saph	4. Plane Trigonometry (First half)	3		119	
Hengstler; Pierce	4. Plane Trigonometry (Second half)	3		72	
Hengstler; Noble; Dickson	4A. Plane Trigonometry (First half)	2			82
Hengstler; Noble	4A. Plane Trigonometry (Second half)	2			63
Hengstler; Noble	4B. Logarithmic Computation (First half)	1			73
Hengstler; Noble	4B. Logarithmic Computation (Second half)	1			60
Hengstler; Haskell	5. Plane Analytic Geometry (First half)	3		80	73
Hengstler; Edwards; Pierce; Noble; Dickson	5. Plane Analytic Geometry (Second half)	3		98	102
Edwards; Pierce; Noble; Dickson	6. Solid and Spherical Geometry (First half)	2		117	106
Pierce; Noble; Dickson	6. Solid and Spherical Geometry (Second half)	2		88	83
Pierce	7. Spherical Trigonometry (First half)	1		10	17
Dickson	7. Spherical Trigonometry (Second half)	1		6	11
Stringham; Haskell	9. Differential and Integral Calculus		3	15	25
Hengstler	9B. Differential and Integral Calculus		3*	30	18
Edwards	10. Problems in the Differential and Integral Calculus	2		17	32
Hengstler	11. Determinants and Theory of Equations		2	18	7
Hengstler	12. Propædeutic to the Higher Analysis		2		
Pierce	15. Analytical Projective Geometry		3		12

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* Beginning in January, 1897.

ENROLLMENT IN THE COURSES OF INSTRUCTION—*(Continued)*.

INSTRUCTOR	TITLE OF COURSE	NO. OF UNITS A WEEK.		NO. OF STUDENTS IN ATTENDANCE	
		One Half-Year	One Year	1896–97	1897–98
Pierce	16. Quaternions		3	5	
Hengstler	17. History of Mathematics		2		18
Stringham	18. Logic of Mathematics		2	17	21
Edwards	19A. Differential Equations	3		34	24
Edwards	19B. Differential Equations	3		4	2
Stringham; Haskell	20. Selected Topics in Higher Mathematics		2	4	4
Stringham	21. Theory of Functions of Real Variables		2		1
Stringham	22. Transformation Groups and Differential Equations		2	6	
Noble	23. Partial Differential Equations	3			3
Haskell; Noble	24. Theory of Functions of a Complex Variable	3		3	6
Haskell	25. Higher Geometry		3		2
Stringham	26. Absolute Geometry		2	5	6
Noble	27. Elliptic Functions		4	3	
Dickson	32. Theory of Substitutions		2		2
Stringham	34. Mathematical Seminary				
	PHYSICS.				
Raymond; Lewis; Alexander	1. Elementary Physics; lectures and laboratory		3	204	181
Lewis	2A. General Physics; lectures and recitations		3	120	134
Lewis	2B. General Physics		2	8	2
Drew; Boynton	3. Physical Measurement; laboratory		2	97	122
Slate	4. General Physics; lectures and recitations		3	60	39
Slate; Raymond	5. Analytic Mechanics; lectures [entered also as Mechanical Engineering 1]		4	61	71
Raymond	6. Harmonic Motion; lectures	2		6	
Raymond	7. Absolute Electrical Measurements; lectures and laboratory	3		23	20
Lewis	8. Theory of Light; lectures	2		6	3
Drew; Boynton	9. Light; special reference to Optical Instruments	2		4	
Raymond	10. Electricity; lectures	2		4	18
Lewis	11. Spectroscopy; lectures	2		6	3
Drew; Boynton	12. Heat as a Form of Energy; experimental lectures	2		6	7
Raymond	13. Physical Optics; laboratory	2			
Raymond	14. Advanced Physical Measurement; laboratory	3		3	4
Slate	15. Dynamics of Rotation		2		4

ENROLLMENT IN THE COURSES OF INSTRUCTION—*(Continued)*.

INSTRUCTOR	TITLE OF COURSE	NO. OF UNITS A WEEK		NO. OF STUDENTS IN ATTENDANCE	
		One Half-Year	One Year	1896–97	1897–98
Slate	16. Special Advanced Study and Research				
Slate	17. Readings and Discussions		2		1
Raymond; Drew	18. Special Undergraduate Study and Research			4	2
	ASTRONOMY.				
Leuschner; Seares	1. Modern Astronomy; lectures		2		19
Seares	1B. Modern Astronomy; lectures	2		4	
Seares; Crawford	2. Supplement to Course 1		1 or 2	4	4
Leuschner; Seares	3. General Astronomy	3		25	4
Seares; Crawford	4A. Practical Astronomy; lectures and observatory work—				
	First half	2*		2	2
	Second half	5†		1	2
Leuschner; Seares Crawford	4B. Practical Astronomy; lectures and observatory work	3		7	9
Leuschner	5. History of Astronomy	3			
Leuschner; Seares	6. Theoretical Astronomy		4	1	2
Seares	7. Method of Least Squares	2		3	
Leuschner	8. Mechanical Quadratures	3			
Leuschner	9. Interpolation and the Use of Tables	3			4
Seares; Crawford	10. Summer School				3
Seares	11. Advanced Practical Astronomy		1	1	1
Leuschner	12. Graduate Course in Theoretical Astronomy		2		1
	CHEMISTRY.				
Rising	1. Inorganic Chemistry; Non-Metals	3		233	
Rising; Gray	1A. General Inorganic Chemistry		3		210
Rising; Gray	2. Inorganic Chemistry; the Metals	3		212	
Sharwood; Rogers	3. Laboratory; Experiments	2		171	171
Sharwood; Rogers	4. Laboratory; Qualitative Analysis	2		160	154
O'Neill; Blasdale	5. Laboratory; Quantitative Analysis—Gravimetric	3		56	80
O'Neill; Blasdale	6. Laboratory; Quantitative Analysis—Volumetric	3		55	68
Rising	7. Inorganic Chemistry; lectures	2		12	

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* First half-year. † Second half-year.

ENROLLMENT IN THE COURSES OF INSTRUCTION—*(Continued)*.

INSTRUCTOR	TITLE OF COURSE	NO. OF UNITS A WEEK		NO. OF STUDENTS IN ATTENDANCE	
		One Half-Year	One Year	1896–97	1897–98
Rising	7A. Inorganic Chemistry; lectures	2		16	
Rising	7A. Inorganic Chemistry		2		16
Rising and Assistants	7B. Inorganic Chemistry; laboratory				1
O'Neill	8. Organic Chemistry: Elementary	2		40	44
O'Neill	9. Organic Chemistry: Advanced	3		8	15
O'Neill; Gray	10. Laboratory: Organic	3		8	
Rising	11. Theoretical Chemistry	3		10	19
Rising; Gray	12. Laboratory: Advanced	3		3	
Rising	13. Quantitative Blowpipe Analysis	2		2	
Rising	14. Gas Analysis and Analysis of Fuels	1		—	
Rising	15. Electrolysis	1		7	9
Blasdale	16. Ore Analysis	2			11
Rising	17. Analysis of Iron, Steel, and Alloys	1			
O'Neill	18. Physiological Chemistry	2			18
O'Neill	19. Laboratory	1			
O'Neill	20. Toxicology; lectures	2		14	
O'Neill; Blasdale	21. Water Analysis	1		10	
O'Neill; Blasdale	21. Water Analysis	2			15
O'Neill; Blasdale	22. Food Analysis	3		10	
Rising	23. Thermo-chemistry	2		1	
O'Neill	24. Selected Topics in Organic Chemistry	1			
Rising	25. Explosives	2		6	8
Sharwood	26. Rare Metals	1		4	2
O'Neill	27. History of Chemistry	1		6	5
Rising	28. Teachers' Course	4		7	10
	30. All undergraduate special laboratory work not included in courses above				3
Rising and Assistants	31. Graduate Course				
	BOTANY.				
Setchell	1. Fundamentals of Botany	3		111	167
Jepson	2. General Plant Morphology	3		111	142
Osterhout	2A. Vegetable Physiology	3			70
Setchell	3. General Phænogamic Botany	3		6	8
Jepson	4. Apetalæ and Endogens	3		4	5
Setchell	5. General Cryptogamic Botany		3	4	12
Setchell	6. Phycology and Mycology		3	4	2
Setchell	7. Pteridology and Bryology		3		
Davy	8. Economic Botany	2		3	3
Osterhout	9. Vegetable Histology		3	2	8
Osterhout	10. Vegetable Physiology	3		25	
Osterhout	11. Vegetable Cytology and Microtechnique		3	1	2

ENROLLMENT IN THE COURSES OF INSTRUCTION—(*Continued*).

INSTRUCTOR	TITLE OF COURSE	NO. OF UNITS A WEEK		NO. OF STUDENTS IN ATTENDANCE	
		One Half-Year	One Year	1896-97	1897-98
Jepson	*12. Morphology of the Compositæ	2		6	
Jepson	13. Taxonomy and Phylogeny of the Phænogams	2			
Setchell	14. Advanced Cryptogamic Botany			1	1
Jepson	15. Advanced Phænogamic Botany			1	1
Osterhout	16. Advanced Histology and Cytology			1	4
Setchell; Jepson; Osterhout	17. Botanical Seminary			1	4
	ZOÖLOGY.				
Ritter	1A. Introduction to Zoölogy		2	146	106
Ritter; Torrey	1B. General Zoölogical Laboratory		2	53	48
Ritter; Merriam	4. Structure and Affinities of the Mammalia	4			22
Merriam	4A. Comparative Osteology	3		10	
Ritter	5. Microscopic Anatomy	4		16	
Ritter	5. Microscopic Anatomy	5			23
Ritter	5A. Physiology	2			17
Johnson	6. Embryology	5		14	16
Johnson	7. An Introduction to Systematic and Field Zoölogy		5	4	
Johnson	7. An Introduction to Systematic and Field Zoölogy		3		5
	8. Seaside Laboratory				
Ritter	9. Asexual Reproduction in Animals	2		6	
Ritter; Johnson	10. Research Work			2	3
Ritter; Johnson	12. Zoölogical Seminary		1		5
Torrey	13. An Introduction to Zoölogical Investigation based on the Cœlenterata		2		4
LeConte	14. Physiological Optics	2		8	
Ritter	14. Pedagogy of Zoölogy				5
	GEOLOGY.				
Lawson	1A. General Geology, Dynamical and Structural	3		92	
LeConte	1A. General Geology, Dynamical and Structural	4			208
LeConte; Merriam	1B. General Geology, Historical	2		16	24
Lawson; Merriam	2. Field Geology		2	9	16
Lawson	3. Petrography		1	8	10
Lawson	4. Petrographical Laboratory		1	8	10
Merriam	5. Palæontology	2		32	

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* Combined with Course 3 in 1896-97.

ENROLLMENT IN THE COURSES OF INSTRUCTION—*(Continued)*.

INSTRUCTOR	TITLE OF COURSE	NO. OF UNITS A WEEK		NO. OF STUDENTS IN ATTENDANCE	
		One Half-Year	One Year	1896–97	1897–98
Merriam	5. Invertebrate Palæontology	2			58
Merriam	5A. Palæontological Laboratory		2	9	11
Merriam	6. Palæontoligical Geology	2		13	
Merriam	6A. Practical Work in Palæontogical Geology	2		8	7
Merriam	8. Advanced Palæontological Laboratory	2		2	5
LeConte	9. Graduate Course. Lectures on the Quaternary Period	2			18
Lawson	10. Graduate Course. Inorganic Geology			4	2
Merriam	11. Vertebrate Palæontology	3			4
LeConte	15. Evolution	2			
	MINERALOGY.				
Smith, Anderson	1. Mineralogical Laboratory		2	43	
Louderback	1A. Mineralogical Laboratory		2		19
Anderson	1B. Mineralogical Laboratory		1		61
Lawson	2A. Crystallography	2		14	
Lawson	2B. Crystallographic Laboratory	2		14	
Louderback	2C. Elements of Crystallography		2		18
Lawson	3. Descriptive Mineralogy	2		12	
Lawson	4. Economic Mineralogy	1		12	
Lawson	5. Graduate Course			1	
	MECHANICAL ENGINEERING.				
Slate	1. Analytic Mechanics [entered also as Physics 5]		4	61	71
Hesse	2. Hydrodynamics	3		27	35
Hesse	3. Hydraulics and Hydraulic Machinery	3		13	18
Hesse; Moss	3B. Mechanical Laboratory	2			3
LeConte	4A. Kinematics, theoretical and applied		2	15	21
LeConte	4B. Kinematics; Draughting and Designing	1		12	20
Hesse	5A. Thermodynamics	3		15	21
Hesse	5B. Dynamics of Heat Engines	3		15	21
Hesse; Moss	7. Mechanical Laboratory; Experimental Engineering		2		4
Chesebrough; Cox	8A. Mechanical Practice	2		37	28
Chesebrough; Cox	8B. Mechanical Practice	2		31	22
Chesebrough; Cox	9A. Mechanical Practice	2		41	14
Chesebrough; Cox	9B. Mechanical Practice	2		3	3
Cory	10. Electrical Machinery and Construction				
Cory	10A. Discussion of Electrical Machinery		2	33	26

ENROLLMENT IN THE COURSES OF INSTRUCTION—*(Continued).*

INSTRUCTOR	TITLE OF COURSE	NO. OF UNITS A WEEK		NO. OF STUDENTS IN ATTENDANCE	
		One Half-Year	One Year	1896–97	1897–98
Cory	10B. Electrical Machinery and Construction		1	26	23
Cory	11A. Alternating Currents and Alternating-Current Machinery	4		20	17
Cory	11B. Electricity in Engineering, and Principles of Electrical Installation	4		15	17
Cory; LeConte	11C. Electrical Laboratory and Designing		3	15	17
	CIVIL ENGINEERING.				
Hunt; Hirst	1A. Field Practice and Mapping—				
	First half	2		73	91
	Second half	1		73	91
Hunt; Hirst; Prouty	1B. Field Practice and Mapping—				
	First Half	1		67	82
	Second Half	2		67	82
Hirst	1C. Topographical Drawing and Lettering	1		2	11
Randall	2A. Railway, Highway and Canal Surveying	3		13	3
Randall; Hirst; Prouty	2B. Railroad Field Practice and Mapping	2		13	2
Randall; Hirst	3. Summer School			34	37
Randall	4. Railroad Economics	3		7	2
Randall	5. Higher Surveying	2		1	
Randall	6. Highways and Pavements	2		7	7
Randall	7A. Framed Structures	3		12	2
Randall	7C. Framed Structures		3	8	9
Soulé	8A. Strength of Materials	4		48	45
Soulé; Hunt	8B. Civil Engineering Laboratory	1		12	1
Soulé; Hunt	8C. Machine Tests of Materials Used in Engineering Construction	2		4	9
Hunt	8D. Materials of Construction	2			4
Soulé	9. Sewer Systems	2		3	
Soulé	10. Irrigation and Drainage	3			
Soulé	11A. Water Supply Systems	3		3	6
Soulé	11C. Civil Engineering Laboratory	1			
Soulé	12. Construction of Dams	3		5	9
Soulé	13. Foundations of Structures	2		6	9
Randall	14. Framed Structures. Continuation of Course 7A	3		5	6
Soulé	15. Laboratory Experiments	2			
Soulé	16. Specifications and Contracts	2			
Randall	17. Framed Structures. Continuation of Course 7C				1

ENROLLMENT IN THE COURSES OF INSTRUCTION—(*Continued*).

INSTRUCTOR	TITLE OF COURSE	NO. OF UNITS A WEEK		NO. OF STUDENTS IN ATTENDANCE	
		One Half-Year	One Year	1896–97	1897–98
	MINING AND METALLURGY.				
Christy	1. Lectures on Mining	4		13	15
Christy	2. Lectures on Mining	4		7	9
Christy; Simonds Richards	3. Mining Laboratory	2		15	28
Christy	4. Summer School of Practical Mining				
Christy	5. Metallurgy: Structural Metals and Fuels	2		51	57
Christy	6. Metallurgy: General	2		13	29
Christy; Simonds	7A. Assaying; lectures and laboratory practice	2		20	29
Christy; Simonds	7B. Assaying; lectures and laboratory practice	2		11	13
Christy	8. Metallurgy of Gold and Silver	2		8	27
Christy; Hersam	9. Metallurgical Laboratory	2		3	7
Christy; Hersam Simonds	10. Metallurgical Laboratory; Mill Work	2		6	9
Christy; Hersam	11. Metallurgy of Lead, Copper, and Quicksilver	2		9	9
Christy	12. Ore Dressing				
	INSTRUMENTAL DRAWING AND ENGINEERING DESIGN.				
Saph	1. Instrumental Drawing	1		106	
Saph	1. Instrumental Drawing	2			97
Kower; Saph	2. Descriptive Geometry		2	137	
Kower; Saph	2A. Descriptive Geometry	2			79
Kower	2B. Descriptive Geometry	2			42
Kower	3. Mechanical Drawing	2		41	22
Kower; LeConte	4. Mechanical Drawing	2		23	21
Kower	5. Graphostatics	2		57	47
Kower	6. Sewer Construction	2		1	1
Kower	7. Construction	2		1	4
Kower	8A. Elements of Structural Drawing		1	12	4
Saph	9. Lettering	3		16	12
	AGRICULTURE, HORTICULTURE AND ENTOMOLOGY. *Agricultural Chemistry.*				
Hilgard; Loughridge	1A. General Course	3		12	17
Hilgard; Loughridge	1B. Chemistry and Physics of Soils	3		9	22
Hilgard	1C. The Relations of Climate to the Soil and to Agricultural Practice	1 or 2			10
Loughridge	1D. Soil Physics	1			8

ENROLLMENT IN THE COURSES OF INSTRUCTION—*(Continued)*.

INSTRUCTOR	TITLE OF COURSE	NO. OF UNITS A WEEK		NO. OF STUDENTS IN ATTENDANCE	
		One Half-Year	One Year	1896–97	1897–98
Hilgard; Loughridge	15. Soil Chemistry and Soil Physics. Advanced Course				——
Hayne; Colby; Bioletti	2. Vinification	2		1	
Jaffa; Colby	3. Agricultural and Viticultural Laboratory		4 or 5	5	7
Jaffa	3A. Analysis of Forage Plants, Hays, and Millstuffs	4		6	10
Jaffa	3B. Dietetics		1		10
	Agriculture and Horticulture.				
Wickson	4. General Course in Agriculture and Horticulture		3	8	10
Hayne	5. Viticulture; Olive Culture	2		17	18
Hayne	5A. Viticulture	2			1
Hayne	5B. Olive Culture	2 or 3			
	Entomology and Bacteriology.				
Woodworth	7. Elementary and Economic Entomology (First half)	2 or 3		26	8
Woodworth	7. Elementary and Economic Entomology (Second half)	2 or 3		36	11
Woodworth	7A. Entomological Œcology; lectures (First half)	2		13	9
Woodworth	7A. Entomological Œcology; lectures (Second half)	2			13
Woodworth	8. Apiculture; lectures and laboratory	3		2	3
Woodworth	9. Parasitic Plant Diseases	2		18	7
Bioletti	9A. Bacteria	1			16
Bioletti	9B. Elementary Bacteriology; lectures and laboratory	2 or 3		18	13
Bioletti	9C. Zymology; lectures and laboratory	3			2
Woodworth	10. Systematic Entomology	3			
Bioletti	10A. Bacteriological Analysis; laboratory (First half)	3			2
Bioletti	10A. Bacteriological Analysis; (Second half)	3		2	1
Woodworth	11. Structural Entomology; lectures	3		4	
Woodworth	12. Entomological Laboratory		4 or 6	1	3
Woodworth	12A. Apiology		1		3
	Agricultural Literature.				
Wickson	13. Seminary Course. Agricultural Literature		1	9	9

ENROLLMENT IN THE COURSES OF INSTRUCTION—*(Continued)*.

INSTRUCTOR	TITLE OF COURSE	NO. OF UNITS A WEEK		NO. OF STUDENTS IN ATTENDANCE	
		One Half-Year	One Year	1896–97	1897–98
	University Extension in Agriculture.				
Wickson	14. Seminary Course. University Extension in Agriculture	....	1	....	9
	MILITARY SCIENCE AND TACTICS.				
Winn	1. Practical Course. Infantry and artillery exercises, signaling, and band practice	....	2	506	563
Winn	2. Theoretical Course	....	1	102	118
	PHYSICAL CULTURE.				
Magee; Reinhardt	1. Elementary Course	....	1½	308	234
Magee; Reinhardt	2. Advanced Course	....	1½	212	217
Magee; Mrs. Magee	3. Course for Young Women	....	10	112	165

TOTAL NUMBER OF COURSES OFFERED.

1896–97	345
1897–98	406

SUMMARIES OF OFFICERS OF INSTRUCTION.

IN THE COLLEGES AT BERKELEY, 1890–91 TO 1897–98.

YEAR	Professors	Associate Professors	Assistant Professors	Lecturers	Instructors	Assistants	Fellows	Totals
1890–91	17	5	5	2	8	11	....	48
1891–92	17	8	8	....	13	12	2	60
1892–93	16	9	10	1	19	18	4	77
1893–94	17	9	12	....	20	23	7	88
1894–95	21	9	12	....	24	17	7	90
1895–96	21	10	13	....	26	18	6	94
1896–97	22	10	18	....	21	28	*8	107
1897–98	†25	8	25	‡2	35	26	6	127

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* Including two Honorary Fellows.
† Including one Honorary Professor.
‡ Including one Honorary Lecturer.

IN THE COLLEGES IN SAN FRANCISCO, 1894–95 TO 1897–98.

YEAR	Art	Law	Medicine	P. G. Medicine	Dentistry	Pharmacy	Veterinary
1894–95	6	3	38	50	37	11	12
1895–96	5	4	51	46	36	11	13
1896–97	6	5	84	54	37	14	15
1897–98	6	6	49	51	41	10	10

In the LICK ASTRONOMICAL DEPARTMENT, at Mt. Hamilton, the number of Officers of Instruction has been as follows: 1894–95, 7; 1895–96, 7; 1896–97, 8; 1897–98, 10.

SUMMARIES OF STUDENTS.

[*Note.*—In the columns showing number of students, the upper figures on the left of each group refer to young men, the lower to young women; the figures on the right side are the totals.]

SUMMARY OF STUDENTS IN ALL DEPARTMENTS OF THE UNIVERSITY, 1890–91 TO 1897–98.

	1890–91		1891–92		1892–93		1893–94		1894–95		1895–96		1896–97		1897–98	
In the Colleges at Berkeley	352		383		446		541		725		811		902		963	
	105	457	164	547	204	650	274	815	399	1,124	525	1,336	596	1,498	702	1,665
At the Lick Observatory, at Mt. Hamilton	3		4		6		5		6		3		1		2	
	0	3	0	4	0	6	2	7	2	8	0	3	0	1	0	2
In the Colleges at San Francisco	302		378		415		474		576		598		574		571	
	9	311	12	390	20	435	92	566	79	655	119	717	146	720	160	731
Total in the University (deducting for duplicates)	657		765		867		1,016		1,301		1,403		1,471		1,531	
	114	771	176	941	224	1,091	367	1,383	480	1,781	644	2,047	741	2,212	860	2,391

SUMMARIES OF STUDENTS IN THE COLLEGES AT BERKELEY.

REGISTRATION BY CLASS AND STATUS, 1885–86 TO 1897–98.

	1885–86		1886–87		1887–88		1888–89		1889–90		1890–91		1891–92		1892–93		1893–94		1894–95		1895–96		1896–97		1897–98	
Grad.	11 2	13	8 1	9	8 4	12	15 0	15	15 6	21	20 5	25	22 15	37	34 13	47	43 21	64	60 40	100	73 45	118	75 46	121	99 75	174
Sen.	13 4	17	29 5	34	29 3	32	34 4	38	32 7	39	40 4	44	28 8	36	27 10	37	44 22	66	79 34	113	83 47	130	88 52	140	128 86	214
Jun.	30 5	35	37 4	41	34 3	37	36 8	44	45 6	51	29 7	36	32 12	44	36 9	45	38 19	57	106 44	150	126 61	187	188 103	291	176 107	283
Soph.	40 4	44	45 5	50	40 10	50	53 13	66	34 12	46	43 12	55	46 8	54	47 14	61	48 23	71	136 62	198	204 102	306	174 92	266	191 106	297
Fresh.	63 6	69	68 8	76	75 18	93	80 13	93	76 18	94	67 11	78	75 19	94	65 18	83	79 25	104	231 109	340	211 122	333	232 106	338	211 128	339
At Large	11 0	11	14 1	15	26 2	28	31 5	36	54 11	65	82 26	108	113 45	158	148 64	212	182 75	257								
Spec'l	12 4	16	16 5	21	21 5	26	27 12	39	26 17	43	30 17	47	41 40	81	58 53	111	62 66	128	72 80	152	77 108	185	91 118	209	102 140	242
Lim.	27 18	45	26 16	42	19 9	28	15 17	32	26 16	42	42 22	64	26 17	43	31 23	54	45 25	70	41 30	71	37 40	77	54 79	133	61 63	124
Totls.*	207 43	250	243 45	288	252 54	306	291 72	363	308 93	401	352 105	457	383 164	547	446 204	650	541 274	815	725 329	1,124	811 525	1,336	902 596	1,498	963 702	1,665

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* Deducting for duplicates.

REGISTRATION BY COLLEGE AND CLASS, 1896–97.

Graduate Students.

Cand. Ph. D.	11	
	4	15
Cand. M.A.	10	
	8	18
Cand. M.L.	2	
	2	4
Cand. M.S.	3	
	0	3
Cand. C.E.	1	
	0	1
Graduates pursuing Special Subjects	48	
	32	80
Total Graduate Students	75	
	46	121

Undergraduate Students.

	SEN.		JUN.		SOPH.		FRESH.		SPEC.		LIM.		TOTALS	
Letters	11		20		19		26		3		4		83	
	9	20	13	33	17	36	23	49	3	6	4	8	69	152
Social Sciences	40		79		71		73		37		32		332	
	40	80	79	158	69	140	65	138	89	126	65	97	407	739
Natural Sciences	8		11		9		5		5		4		42	
	3	11	9	20	6	15	14	19	14	19	9	13	55	97
Agriculture	1		3		3		3		8		1		19	
	0	1	0	3	0	3	0	3	1	9	1	2	2	21
Mechanics	11		36		34		37		9		3		130	
	0	11	0	36	0	34	0	37	6	15	0	3	6	136
Mining	5		19		25		47		13		1		110	
	0	5	0	19	0	25	0	47	0	13	0	1	0	110
Civil Engineering	6		12		3		17		6		4		48	
	0	6	0	12	0	3	0	17	3	9	0	4	3	51
Chemistry	6		8		10		24		10		4		62	
	0	6	2	10	0	10	4	28	2	12	1	5	9	71
Totals	88		188		174		232		91		54		827	
	52	140	103	291	92	266	106	338	118	209	79	133	550	1,377

Total in the Colleges at Berkeley	902	
	596	1,498

REGISTRATION BY COLLEGE AND CLASS, 1897–98.

Graduate Students.

Cand. Ph.D.	10			Cand. Ph.B.	0	
	2	12			1	1
Cand. M.A.	9			Cand. A.B.	1	
	8	17			1	2
Cand. M.L.	1			Cand. B.L.	2	
	5	6			5	7
Cand. M.S.	9			Cand. B.S.	2	
	4	13			1	3

Graduates pursuing Special Subjects	65	
	48	113
Total Graduate Students	99	
	75	174

Undergraduate Students.

	Sen.		Jun.		Soph.		Fresh.		Spec.		Lim.		Totals	
Letters	16		20		21		24		5		5		91	
	15	31	19	39	24	45	36	60	5	10	5	10	104	195
Social Sciences	53		68		59		65		20		34		299	
	62	115	79	147	71	130	81	146	110	130	49	83	452	751
Natural Sciences	13		12		8		12		7		8		60	
	8	21	8	20	8	16	8	20	20	27	7	15	59	119
Agriculture	4		5		2		0		16		1		28	
	0	4	0	5	0	2	0	0	3	19	1	2	4	32
Mechanics	21		27		29		40		10		6		133	
	0	21	0	27	0	29	0	40	0	10	0	6	0	133
Mining	7		28		42		47		29		3		156	
	0	7	0	28	0	42	0	47	0	29	0	3	0	156
Civil Engineering	9		5		12		8		4		1		39	
	0	9	0	5	0	12	0	8	0	4	0	1	0	39
Chemistry	5		11		18		15		11		3		63	
	1	6	1	12	3	21	3	18	2	13	1	4	11	74
Totals	128		176		191		211		102		61		869	
	86	214	107	283	106	297	128	339	140	242	63	124	630	1,499

Total in the Colleges at Berkeley (deducting 8 for duplicates)	963	
	702	1,665

RECAPITULATION.

	1891-92	1892-93	1893-94	1894-95	1895-96	1896-97	1897-98
Officers of Instruction	60	77	88	90	94	107	127
Instructors, including Professors	46	55	58	66	70	71	95
Assistants and Fellows	14	22	30	24	24	36	32
Number of Students	547	650	815	1,124	1,336	1,498	1,665
Graduates	37	47	64	100	118	121	174
Undergraduates	510	603	751	1,024	1,218	1,377	1,491
Number of Courses given*	158	186	225	295	313	345	406

SUMMER SCHOOL COURSES.

ENROLLMENT SINCE ORGANIZATION.

	1891	1892	1893	1894	1895	1896	1897	1898
Chemistry	6	25	16	19	37	56	55	56
Physics	......	15	20	......	30	51	53	49

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* Exclusive of University Extension Courses.

DEGREES CONFERRED, 1894 to 1898.

NOTE.—The statistics are, in each year except 1898, for the calendar year—January to December inclusive. For 1898, they are given to November 1.

Degree		1894		1895		1896		1897		1898	
LL.D.										1	
										0	1
Ph.D.		2				3		1		1	
		0	2			0	3	0	1	0	1
M.A.		4		2		5		0		4	
		1	5	1	3	1	6	3	3	4	8
M.L.				2		1		0		0	
				2	4	4	5	2	2	2	2
M.S.		2				5		1		7	
		0	2			1	6	0	1	2	9
Number of higher degrees		8		4		14		2		13	
		1	9	3	7	6	20	5	7	8	21
A.B.		13		14		13		10		15	
		5	18	8	22	5	18	11	21	15	30
B.L.		15		15		10		8		18	
		14	29	18	33	23	33	42	50	30	48
Ph.B.		10		16		25		37		29	
		14	24	6	22	13	38	22	59	24	53
B.S.	College of Natural Sciences	1		4		7		9		10	
		1	2	3	7	5	12	5	14	7	17
	College of Agriculture	3		0		2		2		1	
		0	3	0	0	0	2	0	2	0	1
	College of Mechanics	4		7		11		10		20	
		0	4	0	7	0	11	0	10	0	20
	College of Mining	3		4		1		5		7	
		0	3	0	4	0	1	0	5	0	7
	College of Civil Engineering	10		6		10		6		9	
		1	11	0	6	0	10	0	6	0	9
	College of Chemistry	1		7		8		5		4	
		0	1	1	8	1	9	1	6	1	5
Number of Bachelor's degrees		60		73		87		92		113	
		35	95	36	109	47	134	81	173	77	190
LL.B.		37		33		47		36		33	
		0	37	2	35	0	47	0	36	3	36
M.D.		28		24		44		6		18	
		3	31	2	26	7	51	2	8	2	20
D.D.S.		18		38		47		38		40	
		0	18	0	38	5	52	5	43	5	45
Ph.G.		21		25		26		17		35	
		1	22	0	25	0	26	1	18	2	37
D.V.S.								3		4	
								0	3	0	4
Number of Professional degrees		104		120		164		100		130	
		4	108	4	124	12	176	8	108	12	142

PROCEEDINGS OF UNIVERSITY SOCIETIES.

PHILOSOPHICAL UNION.

The Philosophical Union has held regular monthly meetings and occasional special meetings during each academic year. In 1896–97, the subject of study was the philosophy of Hegel, as represented in the writings of Dr. W. T. Harris, U. S. Commissioner of Education. The system was critically examined in detail, especially in its bearings upon the theory of knowledge, the criticism of categories, the science of education, the principles of conduct, the conception of personality, the reorganization of logic, and the doctrine of the Trinity. Dr. Harris himself visited the Union in December, 1896, and delivered an address in exposition and defense of the doctrine of the Divine Personality, and in addition held an informal conference with the members of the Union. In March, 1897, Anagarika H. Dhamapala spoke before the Union on the difference between Buddhism and Christianity.

The year 1897–98 was devoted to the study of Empiricism, under the guidance of Professor William James of Harvard University. His recent book, "The Will to Believe, and Other Essays in Popular Philosophy," was used as the basis of study, and papers were read during the year, dealing with empirical views upon determinism, individuality, reason, theism, the value of life, great men and their environment, the Hegelian dialectic, ethics, and the grounds and nature of belief. Professor James came in person to Berkeley and addressed the Union twice in August, 1898. The first meeting was public, and was given in the Harmon Gymnasium. The subject was "Philosophical Conceptions and Practical Results." The address has been published in the September issue of the *University Chronicle*. The second address was more of the nature of a conversational discussion.

Another volume has been published for the Union by The Macmillan Company. It is entitled "The Conception of God," and comprises a long supplementary essay by Professor Royce, in addition to what was included in the pamphlet mentioned in the last biennial report.

During the two years papers were read by Professor Brown; by Professors Griggs and Hudson of Stanford University; by Associate

Professor Bailey; by Assistant Professors Stratton and McGilvary; by Instructor Bakewell, and by Messrs. J. E. Beard and E. N. Henderson; and several addresses were delivered by the President of the Union, Professor Howison.

The programme for the coming year includes an address by Professor John Dewey, of the University of Chicago.

E. B. McGILVARY,
Secretary.

LONGFELLOW MEMORIAL ASSOCIATION.

The Longfellow Memorial Association is now pursuing its fifteenth year of literary and social work. During the years 1896–97 and 1897–98, under the presidency of Professor Albin Putzker and Professor Leon J. Richardson, the following papers were read and discussed: Defects of Congressional Government, by Professor L. Dupont Syle; Reflections on Art and Life in Spain, by Professor Bernard Moses; Origin of the Arthurian Romances, by Mr. Horace Davis; Folk-Lore of our Norse Forefathers, by Mrs. Nicol Beck-Meyer; The Plantin Press and the Plantin-Moretus Museum at Antwerp, by Professor William D. Armes; Personal Reminiscences of Chief Justice Chase, by Dr. W. C. Bartlett; Helen Keller, the Deaf, Dumb, and Blind Girl, by Mr. Warring Wilkinson; Louis Pasteur and his Work, by Mrs. Theodore Hittell; Chinese Marriage Customs and Ceremonies, by Professor John Fryer; Rise of the Messianic Idea, by Professor J. Voorsanger; Scientific Fairy Land, by Miss C. Barto; Evolution and Ethics, by the Rev. W. B. Goeghegan; Voltaire, by Professor Thomas R. Bacon; Vestiges of Roman Customs in Modern Italy, by Professor Leon J. Richardson; Calderon and his Times, by Mr. Cecil K. Jones: Literary Clubs in Ancient Rome, by Professor William A. Merrill.

L. J. RICHARDSON,
President.

SCIENCE ASSOCIATION.

The Science Association of the University of California has continued to hold general meetings about once a month, open to the public, and frequent sectional meetings under the chairmanship of the Vice-Presidents of the various sections, of which there are five: 1. Mathematics and Astronomy; 2. Chemistry; 3. Geology and Mineralogy; 4. Botany; 5. Zoölogy. The following topics have been presented at the general or special meetings of the association during the academic years 1896–97 and 1897–98, in the form of papers or lectures:

1896–97.

September 5—Types of Topography, illustrated by lantern slides; Prof. Andrew C. Lawson.

September 16—The Seaside Laboratories of Europe, illustrated by lantern slides; Dr. Bashford, Dean Columbia University, New York City.

October 6—Recent Facts and Theories regarding Cell and Nuclear Division; Mr. W. J. V. Osterhout. Illustrated.

November 10—The Preparation and Properties of Aluminum; Prof. W. B. Rising.

December 1—Recent Investigations on the Marine Fauna of the Pacific Coast, illustrated by lantern slides; Dr. H. P. Johnson.

February 2—The Physical Theory of Solutions; Dr. E. P. Lewis.

March 2—Giant Kelps of the Pacific Slope, illustrated by lantern slides; Prof. W. A. Setchell.

April 6—The Criteria of Geological Correlation, and their Application to West Coast Tertiaries; Dr. J. C. Merriam.

May 4—Annual Meeting; President's Address: The Flooding of the Golden Gate, illustrated by lantern slides; Prof. Andrew C. Lawson.

1897–98.

October 5—The Higher Utilities of Science; Prof. Joseph Le Conte.

November 2—The Fertilization of Orchids; Mr. Geo. Hansen.

January 18—The Function of the Cell Nucleus; Prof. F. M. MacFarland.

February 8—The Preliminary Computation of Cometary and Planetary Orbits; Prof. A. O. Leuschner.

March 1—Some Recent Experiments in Inverted Vision; Prof. G. M. Stratton.

May 3—Annual Meeting; President's Address: Life in Hot Waters; Prof. W. A. Setchell.

W. J. V. OSTERHOUT,
Secretary.

STUDENTS' AID SOCIETY.

The Students' Aid Society is an organization whose object it is to assist needy and deserving students, not by gratuity of any sort, but by securing for them opportunities to help themselves. During the college years 1896–98 it has assisted nearly one hundred and forty young men and young women to secure employment, the returns for which have aggregated $5,092.25.

At the annual meeting of the Society held March 7, 1898, it was voted to accept the proposition of the Y. M. C. A. of the University, made in August, 1897. It consisted of an offer to perform the duties and accept the responsibilities which have in the past devolved upon the Students' Aid Society. The Y. M. C. A. took complete charge on Commencement Day, May 18, 1898.

J. D. LAYMAN,
Secretary.

DINING ASSOCIATION.

The University Dining Association was established in January, 1894, by a number of members of the Faculties to afford a convenient place where lunch could be furnished to students at cost price. At present the average cost of a meal is about 20 cents.

Since its establishment the attendance has gradually increased until the number of patrons is now about seventy-five, which is more than can be comfortably accommodated in the building used. This number would be largely increased if suitable accommodations were furnished. The various athletic teams have for some years past desired to establish their training table at the Dining Hall, but owing to lack of room it has not been possible to grant their request. A new and larger building is therefore an imperative necessity.

Plans for such a building were drawn, and its construction recommended by the Regents' Committee on Buildings and Grounds last year; but owing to lack of funds the plans could not be carried out. The benefits of the institution are now well recognized, and in order to extend its usefulness the new building should be available for the next college year.

HERMANN KOWER,
President.

OBSERVATION SCHOOL WORK.

By the courtesy of the Board of Education of the City of Oakland, the Tompkins Grammar School has continued to be under the supervision of our Department of Pedagogy. The location of this school in a portion of the city having a fluctuating population, largely of foreign parentage, renders it unsuited to the purposes of an ordinary "model school." But it has served as an observation school, for the study of certain questions in school organization, hygiene, and instruction. The earnest coöperation extended to the Department of Pedagogy by the principal and teachers of this school, and by citizens who have interested themselves in its work, is highly appreciated. Three "Tompkins School Monographs," prepared by the members of the

Department of Pedagogy, have been published by the Oakland Board of Education.

For several years, students of education in the University have regularly visited public schools in San Francisco, Oakland, and Berkeley, for the purpose of studying the actual conduct of school instruction and discipline. During the current year, beginning with January, 1898, this visitation of schools has been supplemented by practice teaching under pedagogical supervision. In the spring term of this year forty of our students were engaged in such teaching in the schools of Oakland and Berkeley. The results of this immediate contact with the practice of teaching were so good that the plan has been continued. Thanks are due to the Boards of Education through whose kindness our students have enjoyed these advantages.

Elmer E. Brown,
Professor of the Theory and Practice of Education.

STUDENTS' CONGRESS.

The Students' Congress, with a membership of over fifty, is the representative debating society of the University. It was organized for the purpose of training in logical argument and the practice of parliamentary law. Several debates are held each year with the Hastings Debating Society of Hastings Law College. The inter-society debate of 1896 was on the question of the election of U. S. Senators by the direct vote of the people; won by the Hastings Debating Society. That of 1897 was upon Single Tax; also won by Hastings. The first debate of the present year was on the annexation of the Philippines; won by the Congress. The second debate was on the adoption of a policy of expansion; won by the Congress. Besides these inter-society debates, regular debates between the members of the Congress are held every two weeks of the college year. The subjects of debate are usually current political questions.

Ira Abraham,
Speaker.

ART CLUB.

The California Art Club was organized January, 1896, for the purpose of fostering and encouraging deeper interest in all branches of art education. Meetings are held at 8 p.m. upon the first Monday of every month. Active members are called upon in alphabetical order to prepare papers upon selected topics. Each paper is accompanied by practical illustrations of the subject—either by original art works or their reproductions.

The following topics have been presented, illustrated, and discussed:

Greek and Roman Art; by Mrs. A. Carlisle.
Artistic Photography; by F. E. Evans.
The Nature of Art; by Chas. A. Keeler.
Modern French Artists; by Miss May Cooper.
The Work of Michael Angelo; by C. E. Green.
Modern Sculpture; by F. Peano.
Art and Religion; by Chas. A. Keeler.
English Art and Artists; by J. A. Dickinson.
Wood Engraving; by W. N. Harris.
Sloyd in Manual Training; by Maurice Kittridge.
Portraiture; by Dr. F. O. Jacobs.
Pompeiian Art; by Miss Annie Edmonds.
Old English and Colonial Wares; by Mrs. W. H. Friend.
Illustrating; by Miss Blanche Bryant.
Miniature Painting; by Miss Alice King.
Artistic Photography; by O. V. Lange.
Water Color Painting; by L. P. Latimer.
Rococo in Decoration; by Mrs. A. F. Woodsum.
Early Dutch Masters; by Mrs. Frances Sleeth.
Opaque Water Colors; by Mrs. Kimball Easton.
The Pre-Raphaelite Brotherhood; by Professor Wm. D. Armes.
Evolution in Art, The Art of Wood Carving, The Anatomy of Expression, Egyptian Art, Classic Art, Mediæval Art, The History of Ornament, Interior Decorations, Ornamental Design; by Professor H. T. Ardley.

HENRY T. ARDLEY,
President.

CALIFORNIA UNION.

The California Union, an organization of graduate students and alumni of the University of California, was established in August, 1897. Its object is to produce a sound and helpful interest in the welfare of the University and thus advance its highest interests: (1) by obtaining and disseminating information on its present and future needs, and on the manner in which the solutions of similar problems have been attempted by other prominent institutions; (2) by free and earnest discussion of the ideas suggested by such information; (3) by coöperation with the University of California Alumni Association and other organizations interested in the welfare of the University. Public meetings are held about once a month to which all interested are invited, and at these meetings special topics are presented by speakers who have had experience in the subject matter; besides which, regular meetings are held for the purpose of detailed discussion and the transaction of business.

The general program for the year 1897–98 was based on the historical development of universities and the university idea. Among the topics presented were:

Oct. 12—General Introduction, Prof. A. F. Lange.
Nov. 4—The University of Bologna, Prof. W. C. Jones.
Dec. 1—The University of Paris, Dr. C. M. Bakewell.
Jan. 10—German Universities, Prof. M. W. Haskell.
Mar. 5—German Student Life, Mr. Chas. A. Noble.
Mar. 24—Early American Universities, Prof. T. R. Bacon.
Apr. 28—The University of Virginia, Mr. Horace G. Platt.
Oct. 4—Clark University, Dr. W. P. Boynton.

GEO. D. LOUDERBACK,
President.

SKETCH CLUB.

The University of California Sketch Club was organized in August, 1898, by a number of the undergraduates of the University. The purposes of the club are twofold: first, the development of artistic ability in its members; and secondly, the improvement as far as is possible of college illustration. A studio has been rented on College Avenue near the University grounds where the regular weekly meetings are held and where most of the work is carried on. The membership is of necessity limited, but it is the aim of the club to include all those students who are most actively engaged in college art work. The club continues its work with enthusiasm and already its effect is noticeable in the college illustration.

H. S. SYMMES,
President.

LEVI STRAUSS SCHOLARSHIP CLUB.

The Levi Strauss Scholarship Club was organized in February, 1898, with two objects in view: to bring about a sense of fellowship and unity among the holders of Levi Strauss Scholarships and thereby to raise and keep at a high level the ideal of character and efficiency of Levi Strauss Scholars; and to make, as a club, a fitting acknowledgment of Mr. Strauss' generosity. The club membership consists of present and past holders of Levi Strauss Scholarships.

C. M. WARNER,
President.

GREEK CLUB.

The University of California Greek Club is an organization of instructors and graduate students for the purpose of mutual study and criticism. In its general plan it is similar to the famous New York Greek Club, which has been for more than twenty years an important factor in the scholarly life of the metropolis, having included in its membership such well-known men as Edmund Clarence Stedman, Howard Crosby, Henry Drisler, Charlton Lewis, and many others of scarcely less note. The essential features of the New York club are translation and free criticism, and these have been adopted as the basis of work here. The club meets every Saturday evening at eight o'clock and adjourns at ten. One of the members reads a carefully prepared translation of a passage (perhaps eight or ten pages) from the work which has been selected for the year's study. The other members then offer their criticisms, and join in a general discussion of any questions which happen to be raised. There are no officers, but the reader of the evening acts as temporary chairman.

The Greek Club was organized in August, 1897, and held thirty-four meetings during the last academic year, reading and discussing six plays of Aristophanes. This year the study of Plutarch's Lives has been taken up. The character of the work (and of the place of meeting) makes it necessary to limit the membership to a small number. Of the present members five are university officers (in three different departments), one is a high school teacher, and three are graduate students.

E. B. Clapp.

STUDENTS' CO-OPERATIVE SOCIETY.

During the last two years, the Students' Co-operative Society has extended the scope of its business so as to supply more needs of students than formerly, and has continued its efforts to give the student the best possible discount in his purchases. The sales during 1896–97 aggregated $22,907.07; during 1897–98, $27,142.41.

W. C. Jurgens,
Manager.

FINANCIAL STATEMENT, 1896–97.

NOTE.—The Act of the Legislature of the State of California, entitled "An Act to provide for the permanent support and improvement of the University of California by the levy of a rate of taxation and the creation of a fund thereof," approved February 14, 1887, contains the following provision:

Section 5. The money derived from said fund must be applied only to the support and permanent improvement of the University, and the Board of Regents must include in its biennial report to the Governor a statement of the manner and for what purposes the money was expended.

The following statement shows in outline the manner and purposes of the expenditures of the State University Fund for the fiscal years 1896–97. Statements showing these expenditures in detail are given in the Annual Report of the Secretary of the Board of Regents for the years mentioned:

RECEIPTS.

Cash on Controller's Warrant	$128,415.46

EXPENDITURES.

Administration—	
Salaries	$29,381.82
Fuel	1,391.43
Equipment	2,012.97
Repairs	1,827.32
Advertising and printing	221.91
Telegraphing and expressage	388.59
Stationery	416.38
Postage	465.50
Official and lecturing expenses	2,832.10
Water	2,714.37
Tents	537.34
Legal services	3,070.10
Diplomas	378.50
College of Chemistry	19,800.01
College of Civil Engineering	15,326.42
College of Letters	5,124.49
Department of—	
Lick Observatory	20,335.66
Biology	529.96
Mineralogy	353.93
Physics	1,719.38
Physical Culture	4,138.85
Botany	496.76
Drawing	107.99
Greek	89.03
Latin	258.13
Decorative and Industrial Art	249.64
Astronomy	218.40
Philosophy	425.67
Library	5,004.16
Museum	992.87
University Printing Office	2,186.60
University Site Improvements	5,419.18
	$128,415.46

FINANCIAL STATEMENT, 1897–98.

NOTE.—The Act of the Legislature of the State of California, entitled "An Act to provide for the permanent support and improvement of the University of California by the levy of a rate of taxation and the creation of a fund thereof," approved February 14, 1897, contains the following provision:

Section 5. The money derived from said fund must be applied only to the support and permanent improvement of the University, and the Board of Regents must include in its biennial report to the Governor a statement of the manner and for what purposes the money was expended.

The following statement shows in outline the manner and purposes of the expenditures of the State University Fund for the fiscal years 1897–98. Statements showing these expenditures in detail are given in the Annual Report of the Secretary of the Board of Regents for the years mentioned:

RECEIPTS.

1898.	
March 31—Cash on Controller's Warrant	$149,111.27
June 30—Cash on Controller's Warrant	66,981.21
	$216,092.48

EXPENDITURES.

Administration—	
Salaries	$30,807.76
Fuel	1,695.74
Equipment	1,946.73
Repairs	2,446.09
Advertising and printing	201.45
Telegraphing and expressage	651.75
Stationery	249.63
Postage	577.50
Examination of schools	1,496.45
Traveling, etc.	2,537.02
Water	2,599.00
Diplomas	633.00
Insurance	240.00
Printing at State Printing Office	1,672.05
Department of—	
Astronomy	3,244.47
Botany	4,833.47
Chemistry	15,673.03
Civil Engineering	9,395.57
Decorative and Industrial Art	2,085.09
Greek	5,895.41
Geology	5,135.02
Lick Observatory	8,920.68
Mechanics	13,979.79
Mining	6,073.73
Mineralogy	145.98
Military Science	430.27
Philosophy	4,586.77
Physical Culture	4,809.17
Physics	11,895.38
Pedagogy	7,499.92
Permanent Improvements	63,734.56
	$216,092.48

UNIVERSITY OF CALIFORNIA

BIENNIAL REPORT

OF THE

PRESIDENT OF THE UNIVERSITY

ON BEHALF OF THE REGENTS

TO HIS EXCELLENCY THE GOVERNOR OF THE STATE

1898-1900

BERKELEY
THE UNIVERSITY PRESS
1900

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BIENNIAL REPORT

OF THE

PRESIDENT OF THE UNIVERSITY

ON BEHALF OF THE REGENTS

TO HIS EXCELLENCY THE GOVERNOR OF THE STATE

1898-1900

REPORT OF THE PRESIDENT OF THE UNIVERSITY.

University of California,
Berkeley, Cal., November 1, 1900.

To His Excellency, Henry T. Gage,
Governor of the State of California:

Sir:—On behalf of the Regents of the University of California, I have the honor to submit our Biennial Report for the years 1898–1900.

In presenting this, my first formal report concerning the work and the condition of the University of California, I should deceive myself much if I did not clearly recognize that the observation of a single year is an insufficient basis upon which to construct secure and final judgments as to the efficiency and as to the needs of an institution established as this is in a peculiar, and, in some regards, unique environment, and possessed of reasonably firm traditions and well-determined academic character, as well as rather unusual complexity of interests and organizations. What I shall say will be said in full consciousness of liability to superficial, immature, and incorrect generalization, as well as to undue application of experience acquired under other surroundings.

Characteristics of the University.

The following characteristics of the University impress themselves upon my first observation: It is a sound, sturdy, dignified institution, strongly intrenched in the love of its alumni and in the pride of the State. It stands in a uniquely close and helpful relation to the school system of the State. A larger proportion of its students comes from the public high schools of its own State than is the case with any other large institution in the country. Its position in properly isolated proximity to a great city of world importance combines all that can be asked for the site of a great seat of learning. Its equipment and income have been steadily outgrown in its rapid development; its buildings are entirely unworthy of its standing and its work. Its educational attitude and spirit are characterized by a reasonable conservatism. Its firm adherence to recognized academic standards has given its work and its degrees recognition with the best.

Faculty Powers.

In its internal and distinctively educational management, extensive powers, including the entire determination of the educational policy, are vested in the faculties; the faculty committees perform services in the regulation of internal details which in many institutions fall to the official mechanism. While this work makes large demands upon the time and strength of the professors, it has the fortunate effect of greatly enhancing their interest in the University as a whole and their loyalty to the institution. The independence of the different departments of the colleges at Berkeley has been, however, developed to a quite unusual degree, and the predominating influence of the heads of departments has probably passed beyond the point at which the fullest effectiveness of the junior members of the faculty can be secured.

Technical and Humanistic Students.

A relatively large proportion of the students in the colleges at Berkeley pursue the general or academic courses, as compared with the technical or professional courses; for the last year such students constituted 70.3 per cent. of the whole number; at Cornell for the same year, omitting all account of law and medicine, they were but 38 per cent. Furthermore, a relatively large proportion choose courses which may be termed humanistic, those, namely, in language, literature, history, philosophy, etc.; it may be noted by way of illustration that at present nearly one-fourth of all the students are registered in one or more Latin courses; at Stanford University less than 10 per cent. appear to take Latin. The subject of Latin is chosen for purposes of illustration merely because it may be supposed to represent most unmistakably the tendency toward humanistic and literary study.

The fact that the University is located in what has been up to this time a new and undeveloped suburb of a great city has made the conditions of student residence somewhat peculiar; a large number of the students have at the end of the day scattered to their homes in Oakland and San Francisco. I shall later discuss this matter more in detail and point to the encouraging tendency toward fuller residence at Berkeley.

Professional Schools Should be Merged.

A striking peculiarity of the University's organization is the existence of a number of more or less closely connected professional schools located in San Francisco. Unless these professional schools can ultimately become as fully and entirely merged in the University as any one of the departments at Berkeley, it seems to me desirable that the connection should terminate. The University cannot be held responsible for that which it cannot control.

Unprecedented Growth in Students.

The tables appended to this report will show that the past two years have been years of unprecedented growth, so far as the number of students in attendence is concerned. The total number of students has been for the year 1898–99, 2439; for the year 1899–1900, 2660. In the colleges at Berkeley the numbers have been, for 1898–99, 1717; for 1899–1900, 1987. The growth in the colleges at Berkeley during the decade, 1890–1900, is represented by the leap from 401 to 1987, which is an increase of about 400 per cent. During the same period the corresponding academic department of Harvard has grown 96 per cent.; of Yale, 154; Michigan, 56; Cornell, 32. The registration for the current year, 1900–1901, is at the present time by no means complete, but is already far greater than for any preceding year. The number registered at the date of writing this report is 2050. Last year's registration at the same date was 1725; there can be little doubt that the complete registration for this year will reach 2300. The new students admitted in 1898–99 numbered 691; in 1899–1900, 853; of the 853, 640 were admitted at the beginning of the academic year, 75 during the first half-year, and 138 during the second half-year. The new admissions of the present year are, up to date, 816. The attendance in all of the colleges of the University, for the year 1900–01, will probably exceed 3000. Including the summer school attendance of 433, and deducting for all duplications, the grand total will be about 3300.

A statistical table prepared by Professor Albert Bushnell Hart for the Harvard Graduates' Magazine shows the relative size of thirteen American universities on November 1, 1900. In number of undergraduates the University of California is exceeded only by Harvard; in the grand total of students, including undergraduates, professional students, and summer school students, it is exceeded only by Harvard, Columbia, Michigan, and Minnesota, in the order named; during the year ending November 1, 1900, its increase in number of students—362—exceeded by 88 that of any other American university during the same period. A summary of these statistics is as follows:

THIRTEEN* UNIVERSITIES.	Johns Hopkins.	Princeton.	Stanford.	Wisconsin.	Chicago.	Pennsylvania.	Cornell.	Yale.	California.	Columbia.	Minnesota	Michigan.	Harvard.
Total undergraduates......	180	1166	1182	1346	1363	757	1600	1802	1895	1412	1450	1573	2495
Total advanced departments .	451	87	80	533	519	1562	841	939	893	1559	1722	1831	1783
Net total regular students...	631	1253	1262	1795	1864	2319	2418	2536	2788	2945	3137	3404	4268
Students summer schools...	......	......	......	334	700?	......	445	......	†433	426	275	251	987
Total university influence.	631	1253	1262	2129	2564	2549	2853	2536	3221	3723	3412	3655	5702
Total gain since Nov. 1, 1899...	—1	59	......	113	274	—65	178	19	362	194	181	168	200

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* To November 1. Comparisons are with November 1, 1899 (approx.).

† 120 of these were also students in regular sessions.

Significant Geographical Classification.

The geographical classification of the students offers some facts worthy of notice as extremely significant of the development of the University. The undergraduate students from San Francisco in 1894–95 numbered 252; in 1899–1900, there were 322; from Alameda county, embracing the cities of Oakland, Berkeley, Alameda, and some outside territory, there came, in 1894–95, 427; in 1899–1900, 740. During the same period the increase from Los Angeles County was very much larger; in 1894–95, Los Angeles sent 48; in 1899–1900, 101. The percentage of undergraduates coming from San Francisco, Oakland, Alameda, and Berkeley, has steadily declined, being 67% in 1894–95, 66% in 1895–96, 62% in 1897–98, 60% in 1898–99, 59% in 1899–1900. In 1894–95 only about 9% of all the students came from the counties south of Tehachapi; in 1899–1900 this had risen to 13.3%. The statistics for the new undergraduates of the present year, 1900–01, show a marked acceleration of the same tendency; 18½% are from the seven southern counties, only 41% from San Francisco, Oakland, Alameda, and Berkeley, as contrasted with 60% in 1898–99. While during recent years there has been a slow increase in the number of students from outside the State, the percentage in terms of the whole number of students has remained between 3% and 4%. The new undergraduates of the present year include about 8% of outside students; or, to make the sudden change more apparent, the total number of outside students among the new undergraduates is this year 66, whereas last year the entire number of outside students in all the undergraduate classes was only 61.

Tuition for Outside Students.

The number of these students has in the past years been so small a proportion of the whole number that no attention was paid to the question of tuition. It would seem to be best that tuition should be exacted of those whose parents or families have not contributed to the support of the University in the form of taxation, and the question of levying such a fee should now be considered by the Board of Regents; the amount to be obtained is small, but the principle involved is unmistakable.

Students Should Live In Berkeley.

In previous years the number of students lodging in Berkeley, that is, having rooms and making their home in Berkeley during the term, has been unfortunately small, but this proportion has steadily increased: in 1894–95 it was 51%; in 1895–96, 54½%; in 1896–97, 57.3%; in 1897–98, 57.4%; in 1898–99, 57.7%; in 1899–1900, 65%; and the present year shows 71.9%. Nearly three-quarters of the students, therefore, are at present making their home during the period of their education in Berkeley. We believe this to represent a fortunate tendency; an important part of university training comes from that contact with university life which can be alone attained when the student lives at the university. A university should not be a day school, and except in cases where the necessities of the student compel his return to his home at night, residence at Berkeley should be encouraged. We are glad to note that the percentage of graduate students lodging in Berkeley is nearly as great as of the undergraduates, being 69.2% for graduate students, 72.1% for undergraduates. This seems to give some reasonable assurance that the great majority of those registered as graduate students are not mere incidental or occasional visitors at the university, but are seriously engaged in constant, continuous work.

Population, Taxable Property and Representation.

A comparison of the number of students sent from the different districts of the State with both the population and the taxable property of these districts cannot fail to have interest and value. In making this comparison it has seemed best to exclude from consideration the special and graduate students; these students, by reason of their maturity, naturally incline to find, or at least to report, their domicile at Berkeley or some place in the neighborhood. A comparison is made for the year 1899–1900:

By Congressional Districts.

The First Congressional District has 7% of the regular undergraduates, 12.6% of the population, 9.7% of the taxable property; the Second Congressional District 5.3% of the students, 13.5% of the population, 10.9% of the taxable property; the Third Congressional District, including the counties of Colusa, Glenn, Yolo, Lake, Solano, Contra Costa, and Alameda, 43.2% of the students, 13.7% of the population, 13.3% of the taxable property. This shows the greatest disparity. The Fourth and Fifth Districts, including the counties of San Francisco, San Mateo, and Santa Clara, have 20.5% of the students, 28% of the population, and 39% of the taxable property; the Sixth Congressional District, 11.9% of the students, 17.5% of the population, 13.3% of the taxable property; the Seventh District, 11% of the students, 14.5% of the population, 13.5% of the taxable property.

Southern Students.

San Francisco fails to have its proper share of students; it has 19.2% of the students, 23% of the population, 33.6% of the taxable property; but San Francisco, Oakland, Alameda, and Berkeley, counted together, have more than their share; these cities have 56.3% of the students, 29.5% of the population, 38.8% of the taxable property. The seven counties south of Tehachapi, it is remarkable to note, have a larger proportion of students than their taxable property claims,—that is, 14.9% of the students against 20.4% of the population, 14.8% of the taxable property.

When it is considered that a great many families move to Berkeley or Oakland for the purpose of educating their children, and furthermore that many students, after a year or two of residence at Berkeley, are likely to change their reported residence from the place of their birth or home to the place of their university residence, it is scarcely remarkable that the bay cities seem to have more than their share. That students frequently change their reported or actual residence after entering the University is proven by a comparison of the percentages of regular undergraduates with the percentages of intrants from the different districts; thus, Alameda county has 37.1% of undergraduates, but only 29.8% of intrants, whereas the seven southern counties appear to have 14.9% of the undergraduates, and 17.1% of intrants. If the comparisons, therefore, which we have made in terms of undergraduates were transferred to a comparison in terms of intrants, we should find a much more even distribution of students with reference to population and wealth. Thus, the seven southern counties have 17.1% of the intrants, against 14.8% of the taxable property; and San Francisco 21.1% of the intrants against 33.6% of the taxable property. The cities of San Francisco, Oakland, Alameda, and Berkeley, still have far more than their share, namely, 50% of the intrants and 38.8% of the taxable property, but the discrepancy is considerably less and the basis of comparison undoubtedly more correct.

Nativity.

Of the 1,665 students in attendance for the year 1897–98, the birthplaces of all but 7 were reported. Of the number 1,033 were born within the State of California, 505 in other States of the United States, 120 in foreign countries, making a total of 625 born outside of California. The percentage of California born students is slightly higher among the undergraduates than among the graduate students; of 572 regular and limited undergraduate intrants of the present year, 1900–01, 341 were born in California, 198 in other States of the United States, 33 in foreign countries; among the 1003 graduates of the University up to and including the year 1895, 503 were born in California, 334 outside of the State, and in the case of 166 we have in the office no record concerning birthplace.

Sixty per cent. California Born.

Taking all the figures into account, it is evident that the percentage of California born students closely approximates 60% in all the different groups, but the admissions of recent years incline toward a lower percentage than those of earlier years. The highest percentage of California born students is obtained from those who entered between the years 1894 and 1896.

Rising Proportion of Women Students.

The proportion of women among the undergraduates has steadily increased. In 1896–97, out of a total of 1,377, 827 were men, 550 women; for the year 1899–1900, out of a total of 1,783, 964 were men, 819 women. The percentage of women for the past four years is as follows: 1896–97, 39.94; 1897–98, 42.2; 1898–99, 44.33; 1899–1900, 46. The proportion of women among the intrants of the present year, 1900–01, will approximate 48%. It is noticeable that the proportion of women is considerably greater in the general courses, that is, those of the Colleges of Letters, Social Sciences, Natural Sciences, and Commerce, than in the University as a whole. The proportion of women in these courses for the year 1896–97 was 53.74%; 1897–98, 57.74%; 1898–99, 61%; 1899–1900, 63.24%. In other words, for the year 1899–1900 nearly two-thirds of the students in the Colleges of Letters, Social Sciences, Natural Sciences, and Commerce, were women. In the College of Social Sciences alone they constituted 68.5%. The proportion of women in the technical courses is and always has been extremely small; Mechanics, Mining, Civil Engineering, have practically no women students, Agriculture very few. The reasons for this disparity are found in the consideration that the actual life-work toward which the technical courses lead is unsuited to women. The fields of activity open to the educated woman are largely represented by the work in the general courses. In particular does the strong demand for women teachers in the schools make it natural that an institution connected as closely as this is with the schools of the State should have a majority of women in those courses which lead toward the teaching profession.

Male and Female Teachers.

That the demand for women teachers is in California relatively strong seems to be indicated by the fact that the average monthly salary for female teachers is higher here than in any other State (California $64.76, Massachusetts $51.41, Pennsylvania $37.84, etc.), whereas California's average salary for male teachers ($81.08) is exceeded by five or six States (*e.g.* Massachusetts $136.25, Rhode Island $103.74); [see Report of United States Commissioner of Education, 1898–99, Vol. I, p. lxxix]. The percentage of male teachers in the California schools has declined from 40.0 in 1870–71 to 33.6 in 1879–80, 21.4 in 1889–90, 21.1 in 1898–99. Of 206 students graduated at Berkeley in 1899, 98 applied for a recommendation for a teacher's certificate, of whom 64 were women, 34 men; of 221 graduated in 1900, 114 applied for the recommendation, of whom 77 were women, 37 men. From among the graduate students there were in 1899, 11 applicants, 5 men and 6 women; in 1900, 14 applicants, 11 women and 3 men. The proportion of all these applicants who for any reason later relinquished the plan of seeking a teacher's position is not large; of the 112 applicants for certificates in 1899, only 13 failed to obtain or seek a position,—of the 134 in 1900, 22 so failed.

This Tendency National.

The increase in women students is not, however, in any way peculiar to California. During the last twenty-five years the number of students pursuing higher education to each million of the population has risen from 590 to 1,215, while the number of women students to each million has increased during the past twelve years from 112 to 323. [United States Commissioner's Report, 1898–99, Vol. I, p. xxxvii.] The percentage of female students in the secondary schools of the United States has steadily increased from 54.9 in 1889–90 to 57.07 in 1898–99.

Distribution According to Courses of Study.

The following facts concern the distribution of undergraduates according to courses of study. These courses appear in two main groups: the first group, which for lack of a better term may be called the group of general courses, includes the College of Letters, leading to the degree of A.B., the College of Social Sciences, leading to the degree of B.L., and the Colleges of Natural Sciences and of Commerce, leading to the degree of B.S.; the second group, which may be called the technical group, includes the Colleges of Agriculture, Mechanics, Mining, Civil Engineering, and

Chemistry. During the past year 70.3% of the undergraduates were registered in the colleges representing the general courses. The registration in the College of Letters shows a steady increase since 1893-94; in that year the number registered was 93; in 1894-95, 113; in 1895-96, 124; in 1896-97, 152; in 1897-98, 195; in 1898-99, 216; in 1899-1900, 266. This is an increase not only upon an absolute basis, but an increase exceeding the growth of the University; thus, in 1895-96, 10.18% of all the students were registered in this college; in 1898-99, 14.11%; in 1899-1900, 14.92%.

Social Sciences.

Since 1895-96 the registration in the College of Social Sciences has been nearly at a standstill, having been 700 in 1895-96, 739 in 1896-97, 751 in 1897-98, 754 in 1898-99, 826 in 1899-1900. In terms of the whole number of students this represents a steady decrease. The percentage in 1895-96 was 57.47; in 1898-99, 48.86; in 1899-1900, 46.32%; and the registration of intrants for the present year, 1900-01, will show a further decrease to 44.8%. The reason for this is probably to be found in the increased recognition of the practical advantages of the technical or scientific courses, coupled with the inclination, very marked in other parts of the country, to revert, in case of desire for a literary course, to the classical curriculum.

Natural Sciences.

The registration in the College of Natural Sciences has shown an uninterrupted increase, both absolutely and relatively, since 1894-95; from 4.69% in 1894-95 it had risen to 7.84% in 1898-99 and 7.9 in 1899-1900. The registration of intrants for the present year, 1900-01, will show a still further increase to 8.7%. With the better equipment and fuller development of the work in natural sciences, particularly on the side of laboratory work, it may be reasonably expected that this increase will steadily continue. The demand throughout the State for well-equipped teachers in the field of nature-study is likely to furnish a constant incentive to such development and increase.

College of Agriculture.

In the College of Agriculture the increase has scarcely kept pace with the growth of the University; in 1895-96 the registration was 15, the following year 21, the next year 32, the next, 1898-99, 21, in 1899-1900, 31; in 1899-1900 the percentage of attendance, 1.73, though greater than the preceding year or than that for the years 1894-97, is smaller than for 1893-94. The present year shows a smaller relative attendance than the preceding. It is not to be expected that the chief service of the agricultural department will consist in directly educating and training those who are to be farmers; the real work of the school will rather be to train those who are to be leaders in the science,—investigators, and distributors of information concerning the results of the most recent research. The distribution of such information must be made through the bulletins, the Farmers' Institutes, and the agricultural press. It is also to be noted that the agricultural department gives instruction to a large number of students not directly credited to the College of Agriculture. These students are not enrolled in the College of Agriculture, because they are not pursuing the full and regular curriculum of that college. They do, however, profit measurably by the presence in Berkeley of the agricultural staff, electing, as a rule, the more general courses in agricultural chemistry, entomology, and horticulture. The number in attendance, therefore, upon the regular courses of this college will at no time furnish any measure of the efficiency of the school and its usefulness to the farming interests of the State.

Short Courses in Agriculture for Practical Farmers.

It is to be hoped that in the near future the development of short courses in agriculture at the university will afford an opportunity for a larger number of persons to come into direct contact with the school and its work. The summer school of the approaching summer will offer a six-weeks course in agriculture adapted to the needs of those who in the nature of the case cannot become regularly admitted and registered students of the university; this course will be adapted to the needs of practical farmers rather than of leaders of research.

Technical Colleges.

In the College of Mechanics the numbers have risen slightly, from 84 in 1893–94 to 127 in 1898–99, and 144 in 1899–1900; in relative terms, however, there has been a slight decline since 1894–95, when the ratio was 10.54%, to 1898–99, when it was 8.29%, and 1899–1900, 8.08%; only in the present year, 1900–01, has a tendency to relative increase shown itself; here the intrants show a percentage of 10. The College of Mining has shown a yearly increase since 1893–94, when the registration was 32; in 1898–99 it was 170, 1899–1900, 191. In terms of the whole number of students, the last year shows a slight decline, from 11.4% of the preceding year to 10.71%, and the intrants of the present year show a still further decline to 8.3%. The increase of the school is, however, assured, and is healthy and normal; the demand for men from this, as from the other engineering colleges, is constantly increasing, and there can be no doubt that the supply of students must ultimately respond to the demand. In the College of Civil Engineering the numbers are less than in 1893–94; after which year the largest attendance was 83, in 1894–95; until 1897–98 there was then a steady decline; during the last two years the tide has turned and the registration of 1899–1900 shows 50, as compared with 40 of the preceding year; or, in terms of the whole number, 2.8% as compared with 2.61%. With the incoming class there is evidence of a strong increase, inasmuch as the intrants show a percentage of 4.8. In the College of Chemistry the increase has been uninterrupted, the percentage having steadily risen from 4.9 in 1897–98 to 6.37 in 1899–1900; the intrants of the present year show 7.9%. The division of the students between two main groups,—the general courses on the one hand and the technical on the other, has remained remarkably constant during recent years; the percentage in the general courses was 71.75 in 1896–97, and 70.3 in 1899–1900. The tendency seems to be slightly in favor of the technical courses, and this manifests itself in a percentage among the intrants of 67.7 for the general courses.

The following table comparing the bachelor's degrees conferred in 1899 and 1900 with those of the two preceding years furnishes other and in some regards safer indications concerning the lines of growth:

	A.B.	B.L.	Ph.B.*	B.S.						
				N.S.	Comm.	Agr.	Mech.	Min.	Civ. Eng.	Chem.
1897 and 1898	51	98	112	31	....	3	30	12	15	11
1899 and 1900	85	130	66	41	3	7	38	41	7	19

Remarkable Development of the Graduate Department.

The development of the graduate department in point of numbers during the last decade has been remarkable; in 1889–1890 the total enrollment was 21; in 1899–1900, 218.

The following table gives a similar comparison for other universities:

	Harvard.	Yale.	Columbia.	Cornell.	Michigan.
1889–90	112	81	70	84	78
1899–1900	320	283	383	170	74

So large an enrollment of graduate students naturally suggests the inquiry whether it is really genuine graduate study that is here involved. The absence of any charge for tuition makes it easy for graduates of any university to attach themselves to the university pending the opening of some opportunity for occupation. The fact that the number of higher degrees awarded by the university is so small seems also to indicate that the graduate work is not of the most serious and continuous sort; during the past two years only 43 higher degrees have been awarded; the degree of M.S. has been conferred upon 15, M.L. upon 11, M.A. upon 12, Ph.D. upon 5. It is particularly to be noted that notwithstanding the large enrollment of graduate students, the degree of Ph.D. has been conferred on an average upon only one or two students each year for the past seven years. This has at least the one encouraging side, that the degree of Ph.D. is maintained at high standard. The percentage of higher degrees to the graduate enrollment in the year 1898–99 was 11.8 at the University of California, 15.9 at Stanford University, 20.2 at Cornell, 48.4 at Harvard.

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* The degree of Ph.B., for which candidates are no longer received, may well be omitted from consideration.

An investigation into the amount of work done by graduate students yields the conclusion that though on the whole the work is not of the highest order and not sufficiently continuous, it is nevertheless genuine so far as it goes. Of the 218 graduate students registered the last year, 58 had, up to October 20th of this year, returned to their work. These figures represent the usual condition at the beginning of a year. It is probable that the graduate work in general lacks continuity. Of the 218 registered last year, there were 42 who completed no specific work in any course; part of these may have been employed on some piece of work which could not be represented in the form of a definite report, but the most of them were probably persons who visited the University and discontinued their work before the year was completed. It is clear, however, that in the case of the remainder genuine work was done. The average registration per student was for over twelve units of study, and credits were reported upon an average of over nine units. In this computation are included even the 42 students who completed nothing. As regards the distribution of graduate work among the different departments, the following order obtains: English, Education, History and Political Science, Latin, Chemistry, Zoölogy, and Philosophy. The greatest number of graduate students registered in any department is found in the department of Education.

Insufficient Differentiation Between Graduate and Undergraduate Courses.

From general observation I am impressed with the belief that the real quality of graduate work differs greatly in different departments; in some departments there is very little differentiation between the work provided for undergraduates and that provided for graduates. Until a strong line of differentiation is drawn, no true graduate work can be expected. The fact that a person is a graduate does not make his work graduate work. Though 47 different colleges and universities are represented amongst the graduate students of 1898–1900, it is still noticeable that only 38% in 1898–99 and 34% in 1899–1900 were graduates of colleges and universities other than the University of California.

During the past five years about 15% of the undergraduates have been registered as special students; in this class are included students of mature age and character who have been admitted to courses in the University upon demonstrating to the officers in charge requisite ability and preparation, and without the ordinary requirements of examination or certification of graduation from an accredited school. The mature age of the student is supposed to give the needed guarantee of definiteness of purpose. The ability to go on with the work of the department chosen is determined by a general consideration of the experience of the candidate rather than by formal examination. It is undoubtedly desirable to leave open this gateway to the University, but it is to be hoped that as the schools become more fully developed, and education more regular, the proportion of this class of students in the University will decline. It is therefore not entirely to our mind that the percentage has risen during the last two years from 15% to 16%. An examination, however, of the work done by the special students gives some encouragement in regard to its serious and successful character. In comparing the work of the special students with that of the regular students, it has seemed best to omit from consideration those in both classes who remain one year or less. There were 268 regular students admitted in 1897–98 who were still in attendance during the year 1898–99, and these students had completed 91.7% of work in the different courses for which they had registered; in the year 1897–98, 37 special students were admitted who were still in attendance in the year 1898–99; these students had completed 95.8% of all the work for which they had registered. It appears, however, that there were 53 special students admitted in the same year who dropped out of the University either during the year or at the end thereof, and the record of these students for completion of work is singularly bad, namely 46.6%. This seems to show beyond any question that this privilege of admission to the University should be much more charily awarded than has been the case in the past.

Special Students.

Should be Less Freely Admitted.

The extent to which the continuity of the undergraduates' work is liable to interruption is well illustrated by the experience of the last graduating class. Of 232 candidates for the bachelor's degree in 1899–1900 only 152 had entered the University as regular students four years before. This number, 152, constituted but 46% of the number of the regular freshmen who at that time entered. It is noticeable that a much larger percentage of the women than of the men (59.4 as against 39.6) were able to carry their course to completion without interruption. About one-fourth of those graduating with the class came to it

Last Graduating Class.

from other classes, from other institutions, or from the ranks of the special and limited students; sixteen came with advanced standing from other institutions; 15 were special students, 6 of whom entered when the class entered; 15 were limited students, 11 of whom entered with the class. Five students completed the course in three years of actual residence, 10 in three and a half, 17 in five years, and 5 in more than five years. The proportion of students completing the course in less than four years is not increasing.

Loss of Students.

Among the undergraduates who were registered for the year 1899–1900, 396 had failed to put in an appearance up to November 1, during the current year, 1900–1901; from this number are of course omitted those who graduated during the last year; of these 396, 96 were regular students in their first year; 93 were special students in their first year. The loss among the first year regular students is therefore only about 18%, while that among the first year special students reaches 57%.

The percentage of graduate students of last year who failed to appear in the present year is 65; the percentage of loss in undergraduates of the preceding year was for the year 1897–98, 22.9, for 1899–1900, 19.9. We must hope that this figure is in steady decline, for continuity in undergraduate work is a matter of considerable importance,—at least it is of great importance that students who have begun a course of study should continue it until graduation; a single interruption, as, for instance, at the end of the sophomore year, may not be of injury to the student, and in case the interruption extends only for a single year and the time has been employed in some practical endeavor, it may turn out greatly to the advantage of the student.

Changes in Professional Schools.

The professional schools in San Francisco show very little change in the number of their students. The total for 1898–99 was 724, for 1899–1900, 671. The Mark Hopkins Institute of Art has shown a decline during the past three years, so also the Hastings College of the Law, and the Veterinary department. The College of Pharmacy has an increase in 1899–1900 over the preceding year, and the Medical department has grown steadily for the past four years.

Occupations of Fathers.

Some figures which have been collected by the Recorder regarding the occupations followed by the fathers of this year's intrants at the colleges in Berkeley may be of interest as showing the wide range of our constituency. It appears from these figures that more than half come from the families of farmers and business men; 20.3% are from the families of farmers, 21.5% from the families of merchants, 8.5% from the families of bankers, real estate, or insurance agents, 2.2% from the families of men engaged in railroad business of some kind. Among the other classes the largest are the following: 10.2% mechanics and laborers, 7.4% clerks, 5.7% lawyers, 5.5% physicians, dentists, etc., 3.6% teachers, 3.4% miners, 3.2% clergymen, 2.8% civil and electrical engineers. The comparison of these percentages with the figures available concerning Yale graduates of the classes from 1883 to 1892 shows some striking contrasts; at Yale 50.7% came from the families of business men, as against 32.2% here; 19.3% from lawyers' families, as against 5.7% here; 10% from clergymen's families, as against 3.2% here.

Age of Graduation. The average age of recipients of the bachelor's degree in the colleges at Berkeley tended to rise slightly during the earlier years of the decade now closing. In 1890 it was 21.9 years; in 1891, 22.4; in 1892, 23.3; in 1894, 23.51; in 1895, 23.54. It has now, however, in 1900, returned to the lowest point reached since 1890, being 22.31. If the cases (8) of those over 30 years be eliminated, the average is 21.76. It is to be expected and hoped that with the regulation and solidification of the secondary school work the average will fall still further.

Reasons for Student Increase. The chief reason for the rapid increase in the number of students at the University is to be found primarily in the character of the population of the State; there exists here no class of the population which is willing to withhold from its children the fullest opportunity for the highest attainment, for there is no class which consciously accepts the doom of mediocrity for itself and its children. The special reason, however, for the rapid growth of the last few years is to be found in the development of the public high schools in their relation through well-formulated courses to the activities of the University. The number of public high schools accredited by the University in 1889–90 was 11, in 1898–99, 76, and in 1899–1900 the number had risen to 87. The number of private schools accredited in 1889–90 was 2, in 1898–99, 15, and in 1899–1900, 23.

Unique Conditions. The report of the United States Commissioner of Education for 1897–98, the latest completed report available, calls our attention to certain very unique conditions existing in the colleges and secondary schools of California. The public high schools of California show an income from all sources of $472,843, which was exceeded in the United States only by the schools of New York, $1,324,157, Ohio, $503,068, Massachusetts, $474,542. The report of

1898–99 (of which Vol. I has just appeared) estimates the value of all the public school property of California at $18,682,634, an amount exceeded by the estimates for only seven states: New York, Pennsylvania, Illinois, Ohio, Massachusetts, Indiana, and Michigan. According to the same report California's total expenditure for common schools is exceeded by that of only eight states, the average expenditure per pupil (30.33) by that of only five, the expenditure per capita of population by that of only two, Massachusetts and Nevada. For each one thousand of population California showed in the report of 1897–98 11.06 secondary students, in which regard it was outstripped by no western state except Nevada; the conditions in Nevada are, however, so peculiar on account of the sparseness of population—42,000—that it seems best to omit comparison with Nevada in these as in the following statistics. It appears that California had in its public high schools 12,620 students, an absolute number exceeded only by that in New York, Ohio, Massachusetts, Illinois, Michigan, Pennsylvania, Iowa, Indiana, Missouri, and Nebraska. Among the freshmen in the colleges and universities, 74.4% of those in California were prepared in the public high schools of the State; this percentage is exceeded in no state of the union except in Minnesota, which shows 76.75%. In the public schools of California over 51% of the pupils are reported to be preparing for college; this proportion is exceeded only in Minnesota, Wyoming, and Arizona; in the two states last mentioned the figures show that the conditions upon which the returns were based were so unusual that the case of Minnesota alone can properly be used in this comparison.

Ratio of Students to Population Unequaled.

Turning now to the colleges and universities, we find according to this same report that in the colleges and universities of the State there is one student for every 419 of population, a smaller ratio than that existing in any other State. Counting together all the California students who are found in any institution of higher learning in the United States, we find that California has 3.15% students to each 1,000 of its population, in which regard it is exceeded only by Massachusetts, Connecticut, and Maryland.

It is furthermore noticeable that California leads all the other States in holding its own students to attendance at colleges within its own boundaries; thus, 93% of all California students keep within their State, 86% of Minnesota students, 87% of Kansas students, 82% of Michigan students, 82% of Massachusetts students, etc. Californians seek the colleges of other States much less than the students from other States seek the California colleges. Eighty-seven per cent. of all the students in California colleges were drawn from California. It seems likely that this contrast will be much intensified in the future. The number of students who are likely to appear at the doors of the University during the next five years will represent a very rapid increase upon those appearing now, and the reasons will be found in the conditions which have been described in the foregoing. The high schools are really just beginning to make the completer organization of their curriculum felt at the University.

Professorships Increase too Slowly.

The number of officers of instruction employed in the colleges at Berkeley was, for the year 1898–99, 141; for the year 1899–1900, 153; this number is greater than at any time in the history of the University; it keeps, as it must, even pace with the growth of the student numbers. Within the past two years the number of students has increased about 20%, the number of instructors at about the same ratio. During the last decade the number of students has increased 395%, the number of instructors 213%. The increase in the officers of instruction is found, however, chiefly in the ranks of the assistants and instructors; the funds available for the purposes of instruction will not admit of the employment of instructors in higher grades, as should be the case. This unfortunate necessity of employing assistants and instructors out of proportion to the number of professors is shown by the fact that during the last decade, while the number of students increased from 401 to 1,987, the number of professorships increased only from 17 to 31.

Distinctive Teaching Positions.

In the professional schools in San Francisco the report of the number of instructors seems to afford no correct measurement of the quality of the work performed; the Hastings College of the Law, for example, reports a total of five officers of instruction for the year 1899–1900, whereas the Polyclinic reports for the same year 82. A large number of names are evidently included in the lists of the departments of Medicine, Dentistry, and the Polyclinic, which do not represent persons actively engaged for any considerable portion of their time in teaching; I would suggest a revision of these lists in the direction of establishing distinctive teaching positions. It may be impossible, so long as these schools are dependent for their support entirely upon the small fees paid by the students, that a very large proportion of the instruction should be given by professional teachers rather than by men whose time is chiefly occupied with the practice of their profession, but this represents a condition of things which should not be permanently tolerated; certainly, we should not allow the lists of university instructors to convey any false impression to the public.

Income for Educational Purposes.

In determining the income of the University which is available for strictly educational purposes, it is necessary to deduct from the gross income the income of special funds entrusted to the care of the Regents for other, though related, purposes, and also the amounts which are necessarily set aside for other objects than the maintenance of teaching at Berkeley; such are, for instance, the Wilmerding School fund, the Lick Observatory appropriations, scholarship and loan funds, and the fund for building and the purchase of land; after such deduction the income proper of the University for the present year and the past three years is as follows: 1897–98, $291,949.04; 1898–99, $314,912.20; 1899–1900, $320,719.86; for 1900–01 (estimated) $317,945. These years include the period during which the second one-cent bill has been in effect. The increase for the year 1898–99 over the preceding year was occasioned by the fact that during that year the university received from the State $16,747.50, being three and a half years' interest on Deferred Funds which the Controller, through a defect in the act appropriating the interest, had declined to pay.

Cheapest Education in the Country.

The estimated income for the present year provides for the 2,300 students entrusted to our care an average of $134.00 per student. This represents, so far as I can find, the cheapest education *per capita* attempted by any university in the country of like, or approximately like, standing. Comparisons with other universities are rendered difficult and misleading because of the necessity of procuring strictly comparable figures; it is not, for instance, reasonable to compare directly Harvard's income of $1,400,000 with our income, for the reason that a considerable portion of Harvard's income must be applied to the support of professional schools and other purposes not represented in our scheme of education.

Eastern Comparisons.

Certain very carefully prepared tables which have been placed at my disposal by Professor Leuschner, undertake to make a strictly accurate comparison of the resources of the colleges at Berkeley and the cost per student for corresponding colleges or departments of Harvard, Columbia, and Chicago; for the year 1897–98 these tables yield the following summary:

	Harvard.	Columbia.	Chicago.	California.
Comparable current expenses	$755,116	$589,913	$551,977	$269,898
Number of comparable students	2,522	1,044	1,326	1,633
Cost per student	$299	$565	$416	$165

For the year 1898–99:

	Harvard.	Columbia.	California.
Comparable current expenses	$798,436	$608,684	$275,006
Number of comparable students	2,602	1,162	1,695
Cost per student	$307	$524	$162

(Data not accessible for Chicago.)

The extreme economy which has been exercised in the distribution of the available moneys of the University shows itself chiefly in the deficient equipment, as of laboratories, libraries, etc., and in the extraordinarily large number of students brought together in single sections and classes. In some cases, as for instance lecture courses in history, philosophy, economics, and the like, a large class can be dealt with almost as satisfactorily as a small one; the personal relation of lecturer to student will of course in a large measure be lost, but the lecture can be delivered and heard as well as if the class were small; large sections become, however, a crying evil when extended to elementary classes in the languages, English, and mathematics, and to the laboratory.

Overcrowded Classes.

I find there were during the past year eight classes containing over 100 students each; most of these were courses whose value might not be seriously impaired by the large attendance; among them were two courses in education, one in history, one in elementary physics, one in elementary botany, one in elementary zoölogy, and two in elementary chemistry. There were fifteen classes containing between 75 and 100 students and thirty-three classes containing between 50 and 75 students; among these were at least three classes in mathematics, no one of which should have contained over 20 students; four classes in German containing respectively 65, 72, 65, and 59, no one of which should have contained over 20 students; five classes in English containing respectively 53, 62, 74, 68, and 61, no one of which should have contained over 25 or 30; four classes in Latin had each 50 or more.

The conditions represented by these figures must be recognized by every one acquainted with educational procedure to be utterly intolerable and unworthy of an institution which is set to serve the best interests of the young people of this State.

Cost of Instruction.

The cost of instruction in the several departments of the university must needs vary greatly. In those departments where the classes are large, where a large proportion of the work can be done in the form of lecturing, it is to be expected that the cost per student will be much lower than in others. In a university where it is important that a large range of subjects should be offered, it is not fair to estimate the work of the department by its cost per student; the whole university is indirectly benefited by the presence of departments even when those departments do not reach any large number of students; nevertheless, it is desirable to know what the cost of teaching in each department or subject may be, in order that at least one basis may be provided for estimating the relative needs and proper demands of the different departments.

An elaborate investigation conducted by the Recorder's office yields a body of figures, presented in later pages of this report, which sets forth the average cost of a unit of registration in each of the departments. A unit of registration is one hour of a student's time at the university, in lecture or in recitation, weekly, during one half-year. Hours in laboratory or field not requiring preparation are estimated in units at a lower rate than lectures or recitations. The cost includes both the salaries paid for instruction and the appropriations made for the general maintenance of the particular department. This table shows that the instruction in Geography, being given for only three hours per week to students registering for a total of 105 units, at a cost of $4,080, represents a cost of $38.86 per unit of registration. In sharp contrast herewith stands the instruction in German, Romanic Languages, Mathematics, English, Latin, and History, each of which costs per unit between $1.94 and $2.86. The most expensive are the following in order: Geography, Semitic Languages, Mechanics, Mining, Oriental Languages, Agriculture, Civil Engineering, Astronomy, Geology.

Summer School a Great Success.

The summer session of the year 1900 represents practically a beginning in the summer school work. Then, for the first time, was this work incorporated under general University management. The summer session of the preceding year, 1899, had been attended by 161 students, most of whom were registered in physics or chemistry. Two courses in mathematics, two in history, and one in education completed the list of all that was offered.

With the summer of 1900 a definite attempt was made to provide systematic university instruction under professors and instructors selected for the purpose, and guaranteed a definite remuneration. The undertaking proved a very great success. Thirty-seven courses were offered in eleven departments, and thirty-five of these courses were actually given. The total number of students enrolled was 433, of whom 90 were college graduates—35 graduates of the University of California, 55 of other institutions; 147 were college students—120 students of the University of California, 22 of Leland Stanford Junior University, and 5 of other colleges or universities. In all, therefore, 237 of the 433 had been students of some university. Two hundred and thirty-nine of the 433 were teachers. Only 74 of the whole number were under 21 years of age, and only 37 could be regarded as strictly preparatory students. A considerable proportion of the work offered in Greek, Latin, Physics and Chemistry was of an elementary order, but it was work done by persons of mature age and experience, and, consequently, scarcely to be ranked as preparatory work. Of the total number enrolled, 254 took examinations. For those who had standing as university matriculates, a certain credit in terms of university work was allowed.

The summer school registration by departments was as follows: Education, 264; History, 230; English, 148; Physics, 103; Chemistry, 99; Botany, 82; Latin, 62; Mathematics, 35; Philosophy, 27; Greek, 11; Semitics, 4. Of the 22 persons engaged in instruction, five were brought from other institutions: Professor Edmund C. Sanford, of Clark University; Professor Clyde A. Duniway, of Stanford University; Dr. Frederic L. Burk, of the San Francisco State Normal School; Dr. C. C. Van Liew, of the Chico State Normal School, and Mr. W. A. Sheldon, of the Ventura High School.

Evenly Distributed Habitat.

It is interesting to note that the habitat of the students at this session was more evenly distributed throughout the State than is the case with the students of the regular sessions. Thus, Sonoma County, which furnished in 1899–1900 only 2.1% of the students at the regular sessions, furnished 7% of the students in the summer session. Fresno County, which furnished less than 1% of the regular students in 1899–1900, furnished 3.7% of those in the summer session. Santa Clara County, which furnished slightly over 1% of the regular students, had nearly 6% of the summer students. Thirty-four students came from Southern California, being 8% of the whole number.

Plans for next Summer's Session.

The financial success of the school makes it possible to extend very considerably its plan for the next year, and the consequent benefits to the students. It is hoped, too, that the school will afford a means for bringing into the University the direct, personal stimulus of teachers from outside both University and State. The receipts for the session were $4,330, the expenses $2,700; the surplus, $1,630, was appropriated to the Library, where it was believed it would be of greatest service to the University as a whole. It is hoped that during the next two years the enlargement of the summer school and the development of a new and greatly extended plan for the University Extension classes and lectures will bring the University into still closer touch with the teachers of the State, and do more than has yet been done toward bringing the teachers into association with the atmosphere of the University.

A Great Library Essential.

Among the departments of the University, none merits greater attention or has greater needs than the Library. The efficiency of all the other departments is dependent upon it. The success of the average undergraduate's work will be largely measured by his use of the Library, and the student in the humanistic lines will find, beside, that the Library is to him both library and laboratory. For the advanced student or teacher engaged in special work and research, the opportunity of access to large collections of the special literature of his subject is absolutely essential; without it he cannot keep abreast of his subject, he cannot know even where to begin his work. Complete sets of the entire scientific periodical literature are for this purpose a most important requirement.

The isolation of California from the centers where great collections have accumulated makes it peculiarly incumbent that here a great library should be founded and maintained as a citadel and refuge for the creative scholarship of the Pacific Coast. With it we can have here a university and maintain the national standards of scholarship; without it we cannot. As our library facilities are to-day, a Californian who undertakes a work of first-rate value in the field of humanistic scholarship, and generally too in the field of natural science, will find it necessary to remove for some considerable period to the seat of an eastern or European library. This represents an obstacle and handicap which we should not impose upon our scholars—which we indeed cannot impose if we aspire to obtain and hold for our professional chairs the best men the profession affords. Here, more than at any university of the country, a great library is needed and is deserved.

Poverty of the Library.

Our Library now contains 80,224 catalogued books; the University of Michigan has 145,460, Cornell 200,000, Columbia 300,000, Harvard 578,000. Last year we were able to spend on books, periodicals, and binding $5,387; Stanford spent $17,000, Harvard $18,604, Yale $16,500, Michigan $15,000, Cornell $23,000, Columbia $27,900. Our annual growth in volumes was 4,600, that of Stanford 7,000, of Michigan 12,000, of Harvard 19,700, of Columbia 20,000.

Imperative Need of Endowments.

We need $25,000 a year for the purchase of books. This means the income of $500,000. Our book funds comprise at present the Reese fund, $50,000, the Jane K. Sather fund, $10,000, and the Denicke fund, $1,000. In no way can an individual, a class, or any organization better create a fund which shall combine permanent memorial with constantly unfolding beneficence than by the establishment of a library fund. A fund of $1,000, yielding at 5% an annual income of $50, will provide each year in perpetuity 25 to 40 books, each of which, in its bookplate duly credited to the fund, will furnish evidence of beneficent intent, and, what is better still, lend help to generations of students as they pass through the gates.

Library Building Outgrown.

The present library building, even at the present rate of book accumulation, will be entirely outgrown as a storehouse within four years; as a laboratory it is already outgrown. One of the first buildings to be begun under the new architectural plans should be the library.

The Staff.

Librarian J. C. Rowell has been accorded a well-earned vacation of eight months, which he is spending in a tour of inspection among the libraries of America and Europe, with the definite purpose of collecting information which shall aid in shaping and equipping the library building that is to be. A trained cataloguer, Miss A. Fossler, a graduate of the Library School at Albany, has been added this year to the library force. Reference Librarian C. K. Jones has recently accepted a position in the Congressional Library at Washington. The present force is greatly overworked and should be augmented next year. I call attention to the various wise suggestions contained in the report of Acting Librarian Layman, and especially to his recommendation that in the annual apportionment of the book fund a considerable part should be set apart for expenditure by the Librarian himself or some central committee acting in the interest of the library as a whole. The assignments to departments must be supplemented by such general assignment as will serve to fill gaps between the interests of the single departments, and provide the literature of general use and reference which gives the whole collection unity and balance.

Department of Philosophy.

With the return of Professor Howison from his year's absence, 1899–1900, the department of Philosophy is now fully and excellently manned. Dr. C. M. Bakewell, a graduate of the class of 1889, who in 1898 was appointed to the headship of the department of philosophy in Bryn Mawr, returns to us this year as associate professor. Dr. William P. Montague, of Harvard University, was appointed instructor in 1898. Dr. Ernest Carroll Moore, Instructor in Philosophy, now divides his time with the department of Education, thus helping to fill the gap created by the retirement of Professor Bailey. Dr. Evander B. McGilvary, who from 1896 to 1899 occupied the post of Assistant Professor of Logic and the Theory of Knowledge, was appointed in 1899 to the important and honorable chair of Moral Philosophy at Cornell. Another graduate of the department, Dr. Arthur O. Lovejoy, of the class of 1895, has been appointed Associate Professor of Philosophy in Stanford University. The healthfulness of the department is amply shown, not only through the participation of its members in the leading philosophical associations and publications, but also in the success of its graduates. A major portion of the support for this department, $6,600 out of $11,700, is accredited to the generosity of Mr. D. O. Mills.

Education.

The force in the department of Education has been reduced this year through the retirement of Associate Professor T. P. Bailey, Jr., a man of fine spirit and excellent enthusiasms, to whose services as teacher and lecturer the students of the University and the teachers of the State owe much of good impulse and uplifting. The organization of the work in this department has now been brought upon a basis of compactness and unity through the completer arrangement of courses, and especially through the more definite prescription of prerequisites for the different studies. Over half the courses now rest upon preliminary work in the department of Philosophy. The increasing coöperation of other departments is also provided for.

Practice of Teaching.

Through the coöperation of the school authorities of Oakland and Berkeley this department has been able to provide, under a course in the Practice of Teaching, the opportunity for a considerable number of its students to do actual teaching under regular supervision and criticism. During the year 1899–00, as Professor Brown reports, "there were 26 students who did such practice teaching during the first half-year, and 35 through the second half-year. Students are permitted to take this course only after they have had a fair amount of theoretical preparation. Their teaching is inspected by the instructors in charge of the course, and they are required to attend a parallel course of lectures and conferences, in which current methods of instruction in their several subjects are discussed and criticized. Students who are preparing for the work of teaching show a hearty appreciation of the practical advantage to be secured by taking this course."

Teachers' College.

The increase of graduate students in the department is one of the hopeful signs, not only for the department itself but also for the educational system of the State. Last year thirty-five different graduate students were enrolled in courses specifically intended for graduates. The steady increase in this class of students shows a fortunate movement in the direction of postponing the professional study of education to a time subsequent to the completion of a general culture course. This tendency points unmistakably, as Professor Brown says, "toward the ultimate development here of a Teachers' College for graduates exclusively."

The officers of this department come continually into most helpful relation to the schools of the State; they are in constant demand for addresses, for advice, and for participation in the work of different commissions and associations. Through none of its agencies does the University more directly aid the best interests of the State than through this. If freed from the painful bondage of its present poverty, the University might, through enlargement of this department, find a means of the highest usefulness in the State. In the midst of their many distractions, it is encouraging to note that all the members of the department find opportunity for frequent contributions to the literature of their subject, and particularly that all of them are now engaged upon more extended works which we may hope to see appear within the next year or two. It is worthy of notice that the head of the department was selected to furnish the report on Secondary Education in the United States, which was presented, with other reports, in the exhibit of the United States Department of Education at the Paris Exposition.

Jurisprudence.

During the absence of Professor William Carey Jones, 1900–01, the work of the department of Jurisprudence is in the hands of Assistant Professor L. T. Hengstler and Instructor G. H. Boke, a graduate of the class of 1894, who after four years of teaching, spent two years of study at the Harvard Law School. The work of the department has been enriched during the past two years by the valuable lectures of Judge Lindley on Land and Mining Law, and by the services of Mr. W. H. Gorrill, a graduate of this University and of the Harvard Law School, who gave a course of lectures on Law of Contracts during the second half-year of 1899–1900. Both these gentlemen served without remuneration, and the thanks of the University are due them for their valuable aid.

Law and Consular Service.

The objects of the department of Jurisprudence are twofold: to meet the needs of students who pursue legal studies from other than the professional point of view, either as part of a liberal education or as auxiliary to their plan of work in other colleges, such as the College of Commerce, or Agriculture, or Mining; second, to provide the basis of a professional training such as may be utilized either in continued study at a law school or in preparation for a consular or diplomatic career. Preparation for a consular career is likely to become in the future an important part of the work of the College of Commerce. The growth of the department, in which are enrolled a representative body of our most earnest and intelligent students, has been continuous from year to year.

The development of legal education within recent decades has reached clearness regarding two conditions of the efficient teaching of law: first, a law school must stand in close connection with a university as one of its departments, and especially must work in coöperation with related departments, such as those of History and Political Science. Second, the teachers of law must be trained teachers as well as lawyers, and must give their chief attention to their work as teachers. The best place for a law school is a university seat; this the experience of Harvard and Columbia amply demonstrates. In the further development of our department of Jurisprudence it is earnestly to be desired that the full coöperation of the Hastings College of the Law be secured, to the end that each may fulfill its completest purpose, but there is no longer room for doubt that the department has a call to enlargement of its scope and extension of its work. With the addition of another instructor, which it is to be hoped the resources of the University will make possible another year, there is no reason why two of the three years of a legal training should not be offered at the University. The provision made by Mrs. Jane K. Sather for a law library as a department of the University Library is a decided encouragement to further development.

The Place for a Law School.

History Professors in the Philippines.

The work of the Department of History and Political Science has suffered considerable rearrangement, if not disorganization, through the absence in the present year of the head of the department, Professor Bernard Moses, who has been called temporarily to the important post of United States Commissioner in the Philippine Islands, as well as through the absence of Professor Carl C. Plehn, Associate Professor of Finance, who has been entrusted with the work of advising the Commission in the organization of the finances of the islands. The urgency and importance of the call made by the Government for the services of these two men, and their peculiar fitness in training, ability and character for the work to be done, made it incumbent upon the University to remove all obstacles to their acceptance. They will return to the University more richly equipped than ever to do the work of preparing men for the practical, as well as scholarly, activities to which their department leads. It will be in increasing measure during the coming years the work of this department to equip men for work in fields of practical statesmanship, such as they are themselves now engaged most actively and intensely in testing and tilling.

Additions to the Staff.

The force of the department was this year increased by the appointment in Grecian and Roman History of Dr. W. S. Ferguson, a brilliant young specialist whose published works have already attracted the keenest interest of the world of scholarship. The large classes which have enrolled for his work attest an unexpected demand for instruction in his particular field. Last year Dr. K. C. Babcock and Dr. T. W. Page, who had been appointed, the one in 1896, the other in 1898, as instructors in the department, were, in recognition of their superior work as investigators and teachers, appointed assistant professors, respectively, of History and Political Science and of History and Economics. To supplement the work of the department during the absence of Professors Moses and Plehn, four temporary appointments were made for the current year: Dr. George B. Wakeman, formerly of the University of Cincinnati, was appointed instructor in History; Mr. Lincoln Hutchinson, a graduate of this University, was appointed instructor in Economics; Professor H. Morse Stephens of Cornell was appointed lecturer in History, and delivered during the first half of the first term two courses of lectures, which were followed with keenest interest, delight, and profit; Professor A. C. Miller of the University of Chicago, a graduate of this University, was appointed Professor of Finance, and will lecture during the second term of the year.

The needs of this department, which, in view of its great usefulness and high standing in the past and its open field for the future, make strong appeal upon the governing board, include an increase of the force, a fuller classification and distribution of the work, and the provision of more distinctive work for graduate students.

Endowment Hoped for Semitic Languages.

The Department of Semitic Languages and Literatures, which began its work in August, 1894, with four students, has developed steadily and healthfully, and in the year 1899–1900 the units of registration in all its thirteen classes amounted to 132 (aside from specials and visitors). Dr. Voorsanger's able and patriotically gratuitous services to this department were supplemented by the appointment, two years since, of Dr. M. L. Margolis, an accomplished scholar, to whom, in the nature of the case, the chief routine work of the department must be entrusted. Dr. Margolis has during the past year given eighteen hours of instruction, Dr. Voorsanger six. Next year a course in Assyriology will be added, through the efforts and generosity of Dr. Voorsanger. A valuable collection of Semitic books, numbering in all about 4000 volumes, has been obtained for the University Library, and we have every reason to hope that the interest and liberality of the friends who have brought the department thus far forward will be retained for it for the future and add to it an equipment and endowment which will be an honor to the State and to the people whose literature, institutions, and tongue it represents.

Oriental Languages.

The Department of Oriental Languages, endowed by Hon. Edward Tompkins, began its work in 1896, and now offers no less than eight lecture courses and eight language courses, with a total of 250 units of registration. To adapt its work more entirely to existing demands, two assistants were this year appointed: Mr. W. N. Fong, to give instruction in the Cantonese dialect of the Chinese, and Mr. Y. Kuno, to give instruction in Japanese.

Our location, coupled with the evident bent of world events, asserts with no uncertain emphasis the duty of this institution to use and to extend the wise provisions of the department's founder. In developing the department in accordance with the intentions of the founder, Dr. Fryer proposes to observe the following main lines of purpose:

Plans for Development.

"1. To provide special facilities for Orientals who have already graduated in schools or colleges in their native lands, and who wish to pursue further studies in America. An illustrated description of the University in the Chinese language has already been circulated among the principal high officials and wealthy merchants of China; and the son of one of the latter class came over from Shanghai last August in charge of the head of the department to study in the University, while others may be expected later on. An Oriental home is needed for them. 2. To promote the establishment by the federal government of an Oriental College of Diplomacy that shall prepare young Americans for consular and other government service in the Orient. This highly necessary undertaking could be carried on in no other place with so much advantage as here. 3. To provide special instruction in Oriental subjects suitable for students who wish to enter upon mercantile or technical pursuits in eastern lands. The present course of lectures on the Commerce of China and Japan, which is well attended, is a step in this direction. 4. To provide special facilities for Oriental studies suitable for persons who wish to engage in missionary or educational work in the Orient. As an illustration, it may be mentioned that the Pacific Theological Seminary has already incorporated the courses of this department in its curriculum. 5. To deliver series of public lectures, with or without illustrations, that shall bring correct notions of China and Japan, with their inhabitants, before the notice of the people of California. Over fifty such lectures have been given in San Francisco and elsewhere, some of them being Extension Courses. 6. To provide facilities for European and American families living in the Orient to send their sons and daughters to this University to finish their education, and thus establish a connection between California and eastern lands that may lead to permanent mutual benefit. 7. To prepare a series of suitable text-books for the use of the students in the different courses of the department. A beginning has already been made in this direction. 8. To conduct original investigations and researches in the different branches of Chinese literature."

Growth of the Department of Greek.

The enrollment in the Greek department for the last year (1899–1900) included 179 different persons. The total of all classes was 260; the total units of registration 1,201. This constitutes by far the largest enrollment in the history of the department. This growth, coupled with the consideration that the number of preparatory students of Greek in the schools of the State during the same period has increased 250%, offers most decided encouragement for the future of the classical and higher literary scholarship of the State. The work in classical archæology, under the charge of Dr. Allen, instructor in this department, has been followed with much interest, and has received stimulus also from the lectures of Dr. Alfred Emerson, provided by the generosity of Mrs. Hearst during the second half-year of 1899–1900, and of Mr. Louis Dyer during November, also made possible by Mrs. Hearst's kindness. The meetings of the Greek Club and of the Homer Club have done much to quicken the interest of the students of Greek, as well as to create a feeling of attachment within the membership of the department.

American School at Athens.

Our membership in the governing board of the American School of Classical Studies at Athens has been maintained for five years by the annual subscription of $250, raised among friends of the University through the loyal assiduity of Professor Clapp. An effort is now making to capitalize this annual payment by raising a fund of $5,000. Through the coöperation of students of the University and by liberal subscriptions from Mrs. Hearst, Messrs. James D. Phelan, Raphael Weill, Louis Sloss, Lewis Gerstel, C. R. Bishop, William Babcock, I. W. Hellman, W. B. Bourne, Levi Strauss, and others, over $3,800 has already been raised, and it is to be hoped that soon the entire amount of the fund will be in hand. It will insure the permanent connection of this University with the School and its beneficent work, and will afford to graduates of this University free tuition in perpetuity.

The cause of humanistic culture has been aided by Mrs. Jane K. Sather's munificent endowment of the Jane K. Sather chair in some department of classical literature.

Interest in Latin.

The whole number of different students engaged during 1899–1900 in the study of Latin was 481, of whom 29 were graduates, 42 members of the senior class, 410 members of other undergraduate classes. The growth in the department in recent years may be shown by a comparison of the total units of registration for 1897–98 and for last year—2,562 against 3,322. The normal growth of this department is significant as showing how, with the constant widening in the scope of the University curriculum, the old traditional lines of work are not neglected, but, on the contrary, flourish with the best. This department is sorely in need of one or more additional instructors. The divisions, especially of the lower classes, are entirely too large for the interests of those taught. I agree with the heads of the departments of Greek and Latin in their recommendation that at the earliest opportunity special provision should be made for instruction in Sanskrit and Linguistics.

Linguistics.

English Department Needs Increased Appropriation.

The English department comes into contact with the largest number of students for the longest period of any of the distinctively educational departments of the University. Its healthfulness and welfare concern very intimately the well-being of the whole. The painstaking endeavors of the department in training students to a sense for form in writing English have been attended with decided success, as one must note in the student publications and the various written productions of the student genius. The recent growth of the University has, however, so overwhelmed the classes of the department that at least in the freshman and sophomore years, where the divisions number forty to fifty, little more than perfunctory, certainly no individual, work can be done. There is need of an Assistant Professor of Rhetoric and Composition, of three graduate assistants for correction of essays, and of an Instructor in Speaking. The annual appropriation to the department should be increased at once by at least $2,000.

German and Romanic Languages.

The departments of German and of the Romanic Languages are nearly on a par in attendance and work, the former showing for the year 1899–1900 just 3,721 units of registration, the latter 3,451. The expense of maintaining the two departments was also almost exactly the same. The resignation at the end of last year of Mr. F. L. Wharff, a faithful instructor in German, left a vacancy, which has been filled by the appointment of Mr. C. R. Keyes, for three years past a graduate student at Harvard. The vacancy occasioned by the death on June 16, 1900, of the Rev. Henry Ongerth, whose conscientious and valuable service as Reader had for seven years been given to the department, was temporarily filled by the appointment of his father, Mr. Michael Ongerth. Both departments demand a considerable strengthening of their force. Especially is the demand for a special teacher of Spanish to be regarded.

Drawing.

With the retirement of Associate Professor Henry T. Ardley, the work of the department of Decorative and Industrial Art has been, for the present at least, merged in that of the department of Drawing, and Assistant Professor Kower has been placed in charge, with Instructors Winterburn and Wythe as his assistants. The drawing courses have been all transferred to rooms in East Hall. Mr. A. V. Saph, instructor in Mechanical Drawing, resigned to accept a fellowship in Civil Engineering in Cornell University; the vacancy was filled by the appointment of a recent graduate of this University, Mr. W. J. Wythe.

Mathematics.

The staff of the department of Mathematics has undergone considerable change. Dr. L. E. Dickson, who in 1899 resigned his instructorship to accept an associate professorship in the University of Texas, has been now appointed Assistant Professor in the University of Chicago. Dr. E. J. Wilczynski, appointed instructor in 1898, has during the past year published several papers in the *American Journal of Mathematics*, and in the *Transactions of the American Mathematical Society*. Mr. R. M. Hathaway, assistant from 1898 to 1900, has been appointed Scholar of the Harvard Club of San Francisco, and will continue his studies at Harvard University. Mr. A. W. Whitney, a graduate of Beloit College and later for two years a graduate student at the University of Chicago, was appointed instructor in 1899. Dr. D. N. Lehmer of the University of Chicago and Dr. E. M. Blake from Columbia University were appointed instructors in 1900. Mr. D. R. Curtiss, a graduate of this University of the class of '99, was appointed assistant in 1900. Instructors C. A. Noble and N. Perry left their positions at the end of the year to pursue advanced studies abroad. During his leave of absence in 1899–1900, Professor Stringham read papers before the Mathematical Club of Chicago, the British Association for the Advancement of Science, the London Mathematical Society, and the Congress of Mathematicians at Paris. The department is excellently manned and is working efficiently. The mass of its work is shown by the 5,990 units of registration to its credit. In this regard it is excelled only by the department of English (6,285 units).

Physics and Chemistry Painfully Overburdened.

The great amount of prescribed work thrown upon the department of Physics, especially by the Engineering Colleges, creates for it a heavy burden and hampers its development, with its present staff, on the lines of free scientific work. The same burden is felt in like, if not greater, measure by the department of Chemistry, and relief is most urgently and properly demanded by the heads of both departments. Nowhere, it appears to me, is the overwhelming increase of student numbers more painfully felt than here. Professor O'Neill reports that in Chemistry the number of students has increased in fifteen years eleven-fold, the number of instructors and assistants only three-fold, and the salary list only two-fold. Of all the painful results incident to the overcrowding of the laboratories and courses, none is so utterly deplorable as the throttling of opportunity for research; no instructor can keep himself fresh for the best scientific teaching work who is not pushing out into new fields and opening up new outlooks upon truth. The addition to the Chemical Laboratory Building, at a cost of $5,000, with $3,000 additional for equipment, will furnish some slight, but still utterly insufficient, relief to the overcrowded building. It was built in 1890 and designed to accommodate 150 students, but is now forced to accommodate 400. In the freshman laboratory 50 working tables are used by 250 students.

The return of Assistant Professor Lewis, after two years' fruitful study abroad, furnishes some relief to the overburdened staff in the department of Physics. Professor Rising, who was appointed as American Juror of Chemical Products at the Paris Exposition, returned to his work October 1.

Co-operation of the Astronomical Departments.

The Astronomical department at Berkeley serves more than one educational purpose; it may indeed be said to offer instruction to four different classes of students: first, those who take the subject as part of a liberal education, desiring to familiarize themselves with the general facts and principles underlying the science, and with its philosophical and historical development; second, the students in the College of Commerce who pursue under the direction of this department the study of navigation and nautical astronomy; third, students in the College of Civil Engineering who pursue under this department the study of astronomy and geodesy; fourth, those who expect to make astronomy their profession. The work of the students in the department is so arranged as to give them the greatest possible experience in practical work and to familiarize them with the actual processes involved in computation; every effort is made so to organize the practical work of every student that every observation and reduction undertaken may have some permanent value. It has therefore been possible from time to time to publish valuable observations and brief theoretical investigations. Especial attention has been paid during the last six years to the exact determination of the longitude and latitude of the Students' Observatory. Excellent progress has been made during the past year toward bringing the forces of the Lick Observatory into closer relation with the Berkeley department of Astronomy; the lectures given at the University the past year by the Director and the astronomers of Lick Observatory served toward this end, as well as provided stimulus to the work of the teachers and pupils at the University.

Botanical Explorations.

The members of the department of Botany, accompanied by advanced students, have generally employed their summer vacation periods in botanical excursions to various parts of California and to points on the Pacific Coast beyond the limits of the State for the purpose of collecting and studying the plants of the different regions visited. In the summer of 1898 the Yellowstone National Park was visited under the auspices of the United States Geological Survey. In the summer of 1899 collections were made along the coast of Alaska, especially in Unalaska. In the summer of 1900 the Hawaiian Islands were visited and the seaweeds of the islands studied, particularly from the phycological and economical points of view. These excursions were undertaken at the private expense of the members of the department making them, but the department has to express its great indebtedness to the Southern Pacific Railway, the Alaska Commercial Company, the Pacific Steam Whaling Company, the Pacific Mail Steamship Company, the Oceanic Steamship Company, and the Wilder Steamship Company for privileges and assistance.

Publications. of Students.

Besides the several papers published by members of the Faculty of the department, and listed elsewhere in this report, several have been prepared and published by advanced students of the department, while others are in process of publication or preparation; among such papers are the following: A. A. Lawson "Some Observations on the Development of the Karyokinetic Spindle in the Pollen-Mother-Cells of Cobaea Scandens Cav.," Proc. California Acad. Sc., vol. 1 (3rd ser., Botany), pp. 169–182, 1898; and "Origin of the Cones of the Multipolar Spindle in Gladiolus," Botanical Gazette, vol. 30, pp. 145–153, pl. 12, 1900; Clara L. Williams, "The Origin of the Karyokinetic Spindle in Passiflora Coerulea Linn," Proc. California Acad. Sci., vol. 1 (3rd ser., Botany) pp. 189–204, pl. 37–40, 1899.

Donations to the Herbarium.

During the past two years very generous and valuable donations have been made to the University herbarium and botanical museum. The names of the donors will be found in the appended list of gifts to the University.

With the last academic year, 1899–1900, Assistant Professor H. P. Johnson retired from the Department of Zoölogy, and Dr. C. A. Kofoid of the University of Illinois was appointed in his place as

Assistant Professor of histology and embryology. Dr. Kofoid will begin his work January 1, 1901. He is well known as an investigator and writer, and the department views his acceptance of the position as involving a most favorable prospect for its future work. Instructor H. B. Torrey resigned in the latter part of 1899 to accept a fellowship at Columbia University. Dr. F. W. Bancroft, a graduate of this University, who was at the time engaged in study at Naples, Italy, was appointed instructor in Physiology, from January 1, 1900. During his first half-year at the University he conducted the laboratory work in elementary zoölogy, which had formerly been directed by Mr. Torrey. It is expected, however, that under his hand the work in Physiology will be strongly developed, and to this end arrangements are now making for the equipment of a physiological laboratory to occupy the basement of the east wing of East Hall. The demand for thorough-going work in this subject is pressing upon us through the requirements in the preparatory training of medical students. Mr. Frank F. Ellis was appointed assistant in Zoölogy for the first six months of the present academic year. Miss Alice Robertson, a graduate student of this department, received the honor of appointment as LeConte Memorial Fellow for the year. (The other LeConte Fellowship has been awarded to Mr. Knight Dunlap, who will pursue graduate study in psychology at Harvard.)

New Physiological Laboratory.

Zo-ological Research.

It is the very proper ideal of the Department of Zoölogy that each teacher shall be expected and allowed to devote half of his time to investigation; though this is not always possible, still the ideal is approached, and contributions made by members of the department to scientific knowledge are increasingly numerous.

Additions to the Museum.

Two particularly important additions to the Zoölogical Museum have been recently made: First, a carefully selected series of about fifty typical vertebrate skeletons, a gift from Mrs. Phoebe A. Hearst; second, an extensive collection of marine invertebrates, obtained by Professor Ritter while a member of the Harriman Alaska Expedition during the summer of 1899. The lack of proper housing for the rich collections which are accumulating is a constant source of vexation, as well as anxiety. The wooden buildings in which they are now stored are too unsafe to be used as depositories for such precious material.

Changes in Mineralogy.

The constant increase in the number of mining students has necessitated the fitting up for the Department of Mineralogy of two large new laboratories on the second floor of South Hall. Assistant G. D. Louderback resigned in January, 1900, to accept the Professorship of Geology in the University of Nevada; the place was filled by the appointment of Mr. F. C. Calkins, a graduate of the class of 1899. Assistant W. S. T. Smith resigned in June, 1900, to accept a post on the United States Geological Survey; his place was filled by the appointment of Dr. A. S. Eakle, a graduate of Cornell and the University of Munich, instructor formerly at Cornell and at Harvard. He brings to his work here thorough special equipment, and is likely to be a very great aid to the departments both of mineralogy and mining.

Expeditions to Oregon.

The work in Palaeontology has been forwarded and stimulated through the excursions which have been made in the summers of 1899 and 1900 into the John Day fossil fields of eastern Oregon. These expeditions were under the charge of Assistant Professor John C. Merriam. The material obtained during the two seasons has very greatly increased the value of the general collections used for teaching, besides furnishing material for the original work carried on by the advanced students at the University. Funds for defraying the expenses of the two expeditions, to the extent of $1,175, were subscribed by friends of the University.

Mechanical Engineering Laboratory Needed.

The Department of Mechanical Engineering makes a strong demand for the creation of a mechanical engineering laboratory. The machine shop requires also an increase of room and equipment. Since the present building was occupied, in 1893, the number of students has greatly increased, and certain parts of the building are already outgrown. Many appliances and pieces of apparatus which have been offered by engineering firms for the use of the department could not be accepted for lack of proper facilities for their use. The work in Electrical Engineering, under the charge of Associate Professor C. L. Cory, has been strongly developed, and promises to become one of the important fields of University work.

Irrigation. Sanitary Engineering. Good Roads.

The Department of Civil Engineering makes an urgent request for the appointment of an Associate Professor of Civil Engineering, who shall be able to give instruction in some of the new technical branches developing themselves in connection with the profession of civil engineering. There are many fields toward which the department feels itself drawn; first, the matter of water rights and the irrigation of lands in California, which is now in the way of being presented most forcibly to the people through the newly formed Water and Forest Association; second, various phases of sanitary engineering, for which a special apparatus for making tests of sanitary devices and mechanisms is now demanded in the way of equipment; third, the matter of road building, concerning which much interest has already been displayed in this State, indicative of a practical movement which is likely soon to formulate itself. It has been the aim of the department to stimulate study and investigation in this particular direction, and the owners of quarries throughout the State have been invited to contribute material for inspection and test; some thirty or more have already responded, and a circular giving the result of laboratory investigations has been published and distributed. The apparatus already owned by the college for testing road materials is good and entirely complete. The laboratory used for testing the materials requires for its thorough equipment an appropriation of $2,000, and this ought to be supplied.

Summer School in Surveying.

The so-called summer school in surveying, which occupies the first month of the summer vacation, with continuous work in the field, has proved very successful, and is highly appreciated by the students—so much so, indeed, that applicants have to be turned away each year on account of lack of proper accommodations. A camp is chosen in some remote and yet topographically suitable locality, and is outfitted with tents and apparatus owned by this department; under the direction of two or three of the Engineering instructors, the best methods of surveying land, of leveling, and of running lines of road and railway are taught practically by continuous work.

Irrigation Survey.

During the past summer the Dean of the College of Civil Engineering has been engaged in making an irrigation survey of the San Joaquin River and some of its tributaries, and his report will be presented to the Water and Forest Association, as well as to the United States Department of Agriculture.

The University and the department suffered a great loss in the death on December 23, 1899, after a long illness, of Harry Herbert Hirst, Instructor in Civil Engineering. Mr. Hirst was medalist of the class of 1896. His work in the college of civil engineering justified the brilliant promise of his undergraduate days. His untimely death is deeply to be deplored.

New Mining Laboratories.

The growth in the Department of Mining has been referred to in another connection. This growth is all the more notable, in that it has taken place in the face of a continued increase in the entrance requirements. The number of Mining students graduated in 1900 is as great as all who were enrolled in 1888–89. The mining laboratories provided by the generosity of Mrs. Phoebe A. Hearst have equipped this department in such a way that until the erection of new mining buildings its needs are well provided for. Some of the rooms in the old building, as those used for the assaying laboratory, are, however, somewhat too small for the need, and were never well adapted for the purpose.

Gifts.

The department has been the recipient, from time to time, of various donations toward the equipment of its laboratories. Among these may be mentioned: A large number of furnace models, the gift of Mr. J. B. Randol, of New York; a Michel amalgamating pan, the gift of Mr. Allen, of Nevada City; a Freeman dry concentrator, the gift of the inventor; an Ingersoll Eclipse rock drill and a Rand Little Giant rock drill, both the gift of the manufacturers; a Comet ore crusher and ore sampler, the gift of Fraser & Chalmers, of Chicago; an ore-sample grinder, the gift of the E. P. Allis Company, of Milwaukee, Wis.; a Johnson concentrator, the gift of the inventor and the Risdon Iron Works of San Francisco; two models of the North Star Mine, loaned by Mr. James D. Hage, of New York City; two models of the Bunker Hill and Sullivan Mine, the gift of Mr. F. W. Bradley and Judge Curtis H. Lindley of San Francisco; several lots of ore have been donated by various mine owners for experimental purposes, and the Selby Smelting and Lead Company have sent us many samples of ore and products of their manufacture.

Mr. George J. Young, who had rendered valuable service as Analytical Assistant since his graduation in 1899, was in August, 1900, appointed Assistant Professor of Metallurgy in the Nevada State University.

Farmers' Institutes.

The report of the Agricultural Department is published separately, and to that I refer. The department has served a most excellent purpose in maintaining the Farmers' Institutes, some eighty to a hundred of which are attended by members of the department each year. Notwithstanding the appointment of two Conductors, who undertake the making of all the preliminary arrangements for these meetings and participate largely in the discussion, the necessity exists of sending at least one additional member of the staff to join them at each meeting. This has the effect of seriously interrupting the work of the department at home, and of withdrawing men from its already too limited force. The work of maintaining these institutes is surely one of the opportunities and privileges of the department, but special provision for their financial support, it would seem, ought to be made by the State. The limited budget of the department is seriously strained by the present demands upon it.

Dairy Husbandry.

The appointment in 1900 of Mr. Leroy Anderson of Cornell University as instructor in Dairy Husbandry has been an important step forward toward the formation of a genuine school of dairy husbandry at this University. The needs of the State in this regard are too unmistakable for the University to hesitate in undertaking this work. A practical dairy school should be established in close connection with the University; it is to be hoped that the means for this will be provided forthwith either by private generosity or by the State.

Forestry.

The establishment of a School of Forestry is one of the duties of this University, and should not be long delayed; it cannot be done, however, with any means which are now in prospect. It is doubtful whether the work should be undertaken unless an annual income of from $20,000 to $30,000 can be assured.

Veterinarian Needed.

The appointment of a veterinarian in connection with the Agricultural Department is a necessity. The Department of Entomology, which has been always made a subdepartment of Agriculture, demands very decided strengthening and development. Additional assistance in the laboratory of agricultural chemistry is also needed.

New Armory.

The Department of Military Science and Tactics has been placed under the charge of Captain Henry DeH. Waite, a graduate of the United States Military Academy. The department will shortly be provided with new and most commodious quarters in the basement of the Gymnasium; this will set free much-needed space in the basement of North Hall, and will furthermore have the advantage of placing the Military and Physical Culture departments near together.

Enlarged Gymnasium.

The Department of Physical Culture rejoices in the occupation of the enlarged Harmon Gymnasium. This building, first erected and presented to the University by the late A. K. P. Harmon, of Oakland, in 1878, has proved one of the most serviceable donations ever made to the University. The structure has now been enlarged so that it will accommodate 315 students engaged upon the floor at one time in class work; formerly it would accommodate but 140. The building is now 181 feet long and 80 feet wide, and includes a large stage, 40 by 30 feet. The annexes, of which there are three, contain 58 shower baths, dressing rooms, athletic quarters, offices, a small lecture room, and 700 lockers. Through the generosity of Mrs. Phoebe A. Hearst, by whom also a large part of the expense for the additions was provided, the Gymnasium is now fitted with the finest of modern apparatus, the equipment being superior, probably, to that of any university gymnasium in the United States in quality, quantity, and usefulness. The one great lack in the Gymnasium outfit is that of a swimming tank.

Swimming Tank a Great Lack.

Prescribed Gymnasium Work for Women.

Gymnastic work is required of the male students for two years. The classes for men meet three times a week. After the completion of Hearst Hall it will be required also of the women. It is expected that Hearst Hall will be ready for occupancy by January, 1901. This building, when completed, will be without doubt the best equipped gymnasium to be found in the country. The apparatus provided by Mrs. Hearst for the building has cost about $5,000. It is intended to provide in connection with the gymnasium a court 100 feet square, where basket-ball and other outdoor games suitable for women can be held. There is to be also a running track extending around the entire court.

Hygiene.

I wish to call attention to the establishment of a course in Practical Hygiene for the women students. This course is given by Dr. Mary B. Ritter, who has been appointed with the title of Woman Physician and Lecturer in Hygiene.

College of Commerce.

The work of the College of Commerce, as outlined in the curriculum adopted by the Faculty, does not include a sufficient amount of work characteristic of commercial activities. The Faculty has intended a thorough revision of its curriculum, but until the funds of the University or the special equipment of this school make it possible to add a number of chairs for the teaching of practical commercial subjects, it is feared that the college will not fulfill its highest opportunity.

Geography, Russian, and Business Procedure.

The work in Geography, conducted by Professor Davidson, has given very particular attention to the subject of currents and climatology of the Pacific. It is necessary that this work be very much enlarged by a study of the products and climates of the other regions involved in the trade connections of this country. It is highly important that there should be offered to students in the College of Commerce instruction in the Russian language, and, to a fuller extent than our possibilities now allow, in the Spanish language. Provision has already been made for instruction in Chinese and Japanese. Added instruction is needed in banking, insurance, statistics, and in various fields of practical business procedure. The founding of the Pacific Commercial Museum promises to provide for this school an invaluable laboratory.

Changes in Degree Requirements.

Among the various items of recent Faculty legislation, reference should be made to the following: On December 11, 1899, the courses of the College of Letters, of Social Sciences, and of Natural Sciences, were revised so as to provide much greater elasticity in the formation of the groupings upon which the work of the iudividual student is shapen for his last two years. As the field of University study gradually widens by the addition of new studies and the differentiation of old ones, the difficulty of formulating definitely specified courses steadily increases, and while there appears to be no inclination on the part of the Faculty to introduce such entire freedom as would make it possible for a degree to be obtained either by a congeries of unassorted choices on the one hand, or by a limitation to a single line of work on the other, it is evident that the tendency toward an orderly grouping of general subjects rather than a prescription of definite classes or tasks is plainly and unavoidably asserting itself. The grouping of subjects in the earlier part of the course tends to serve the purposes of general training, and at the same time of securing a foundation for later attainment; the grouping in the latter part tends toward giving control and perspective in some one general field of knowledge. The subjoined table compares the old requirements with the new.

Redistribution of the credits* required for the bachelor's degree in the Colleges of Letters, Social Sciences, and Natural Sciences.

	Old plan.	New plan.
(*a*) Prescribed (fundamental) studies	65	59
(*b*) Group studies—an elective group of advanced courses dealing with one subject, or not more than two cognate subjects	30	24
(*c*) Studies to be chosen without limitation to group	30	42
Total credits for degree	125	125

Additional Freedom of Election.

It will be seen that the revision involves a reduction in the time required for the prescribed studies and for the group studies, and a corresponding gain in the time available for election without limitation to groups; and this additional freedom of election is further secured by a provision definitely limiting the amount of preliminary work that a department may exact as a condition for entrance upon its group-elective courses. Formerly there was no such restriction. The student sometimes found that he could not qualify for his group studies without a serious encroachment upon the field of his so-called "free electives." The prerequisites to the groups are now to be confined to such courses as may conveniently be included by the student in his fifty-nine units of prescribed work, together with not more than twelve units of the electives. Thus there remain at least thirty units absolutely open to free election; in practice, there are usually more than thirty.

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* The measure of a unit of credit is one hour of recitation or lecture per week during one half-year. Each hour of recitation or lecture presupposes an average of about two hours of preparation. Hours in the laboratory or field not requiring preparation are therefore estimated in units of credit at a lower rate than recitations or lectures.

To sum up in a slightly different form: The student in the College of Letters, of Social Sciences, or of Natural Sciences gives less than one-half of his undergraduate course to those studies, more or less elementary, which the University prescribes as fundamental; less than a fifth to advanced studies in his chosen specialty or major subject; practically a quarter to absolutely free electives in any field; and the small remainder, less than one-tenth, either to unrestricted or to restricted electives, as the exigencies of his major subject may permit or require.

Pedagogical Requirement.

Another change affected that large body of students who are making special preparation for the teacher's profession. Such students are required: (1) to meet certain general requirements calculated to secure a reasonable breadth of culture; (2) to prepare for the teaching of at least one subject as a specialty; (3) to have a certain minimum of professional or pedagogical training. This professional requirement had been met ordinarily by the election of courses in the department of Education amounting to twelve units. The prospective teacher now has the option of reducing his time in the department of Education to eight units, provided he gives the time thus subtracted from the more strictly professional side of his preparation to the department of his teaching specialty.

Foreign Languages.

The regulation requiring students who elect a foreign modern language to pursue such language during at least two years was abrogated April 18, 1900. German, French, Italian, or Spanish may now be elected for a single year only, if the student so desires.

On May 14, 1900, the following rules regarding the treatment of delinquent students were adopted:

Delinquent Students Automatically Dropped.

1. Any undergraduate who, at the end of any half-year, fails to pass in at least five units of new work will be dropped from the roll; provided, that any student who for reasons of exceptional urgency is permitted to register for less than five units of new work will be required to pass in all of the units so registered, or will be dropped from the roll.

2. A regular or limited student dropped from the roll on account of deficiencies will have an opportunity to reënter after an interval of

one half-year; provided that during the interval he make good by reëxamination his deficiency in the five units required in 1, as above; and provided, further, as a condition of further University work, he first remove all matriculation deficiencies.

No Special Ruling Against Athletes.

3. That Regulation 31, requiring of participants in intercollegiate athletic contests a standard of scholarship different from that required of other students, be abrogated. These rules have the effect of providing an automatic method whereby the student's own delinquencies exclude him from the rolls. The necessity for a special ruling in the cases of participants in intercollegiate athletic contests therefore disappears; one who falls below the requirements is removed from the rolls, and as being no longer a registered student, cannot represent the University on its teams. Definite elimination from the University constitutes no hardship, as a way is provided in Rule 2 whereby deficiencies may be repaired at the beginning of each term.

Association of American Universities.

A movement, begun in the Graduate Council in March, 1898, toward stimulating the coöperation of the leading American universities in regulating the standards for the higher degrees, resulted in an invitation for a university conference, extended by the universities of Harvard, Columbia, Johns Hopkins, Chicago, and California, to the following universities: The Catholic University of America, California, Columbia, Cornell, Harvard, Johns Hopkins, Michigan, Pennsylvania, Princeton, Stanford, Wisconsin, and Yale. The conference was held at Chicago in February, 1900, most of the universities being represented, and resulted in the formation of the Association of American Universities, the first organized union in any form of the higher institutions of learning of the country. It affords a long-needed opportunity of conference upon matters common to the interests of all those American institutions which are now shaping the graduate courses of instruction into a definite body of professional work.

Examination of Schools.

On September 24, 1900, the Schools Committee of the Academic Council adopted an important change in the hitherto existing plan for the examination of schools. The administration of our system of school accrediting is of such serious importance, both for the University and the schools, and has been attended in the past with so much success in achieving the purposes desired, that any essential modification of it can be undertaken only after careful consideration, and must be watched in its results with greatest solicitude. The following table, which shows the overwhelming proportion (in 1899–1900, 83%) of admissions by recommendation from accredited schools, gives sufficient ground for our interest and solicitude. If the examinations upon which our accrediting is based are seriously defective, our control over the standards of admission is deceptive and feeble.

	Number Recommended for Admission to Regular and Limited Status.		
	1898–99	1899–1900	1900–01 to Nov. 1
1. On recommendation from accredited high schools	387	434	479
2. On recommendation from State Normal schools	16	27	21
3. On examination wholly	13	21	21
4. On credentials from other colleges or universities:			
(*a*) To Freshman standing	13	20	21
(*b*) To advanced standing	16	22	21
Totals	445	524	563

Concentration of Work.

The method hitherto pursued places the individual departments of study in the schools in direct relation to the corresponding departments of the University. The theoretical advantage of bringing to the different departments of the schools the stimulus of direct contact with the higher teaching of corresponding subjects is perfectly apparent. The theoretical disadvantage of regarding the schools by parts and putting them into connection with parts, rather than the whole of the University, is also plain. The new plan proceeds by correction rather than by overturning, and attempts to renew the advantages of the old while remedying the defects. It is a tentative and provisional plan. Concerning its success, it is vain to prophesy, as it has to be tried. One benefit which it is hoped may incidentally accrue to it is the prevention of the intermittent interruptions which have come to the work of the departments, and to an apparently unnecessarily large number of individual professors, through the necessity of making the annual school visitations. The tendency of the new plan is to concentrate the work upon fewer men, who themselves concentrate their examining tasks upon a whole semester. The plan is given in the following, as adopted by the committee:

Schools Committee's Report.

(I.) The examination by departments, when wisely conducted, has shown itself productive of good results in stimulating and interesting teachers. Granting that our procedure may now be revised with profit, changes should be made conservatively, gradually; preserving the present good features and removing weaknesses.

(II.) It seems advisable to divide the matriculation subjects into two groups, to be treated differently for the year 1900–01.

A

English (Babcock, Richardson).
Mathematics (Drew).
History (Babcock).
Latin (Richardson).
Physical Sciences (Drew).

B

Greek (Clapp).
Biological Sciences (Setchell).
French (Chambers).
German (Centner).
Drawing (Kower).

Group A consists of subjects whose scope and methods are, at the present time, more fully determined; whose status in the schools has become stable. Group B contains subjects which, for various reasons, seem to need careful attention to their development.

(III.) It is proposed to assign three examiners to Group A, and divide the five subjects among them. The details of this division will depend to some extent upon the persons selected. It seems natural to give mathematics and physical sciences into the hands of one person. Then English, Latin and history would remain for division between two.

(IV.) It is proposed to assign one examiner to each of the subjects in Group B, counting biological sciences as one, and leaving the question open whether French and German shall count as two or one.

Fewer Examiners.

(V.) It is suggested that, while these modifications be put into operation for the year 1900–01, the further course to be pursued be carefully considered. The indications point towards a (numerically) smaller commission, or one commissioner even. We must watch developments. It is thought, however, that the examination by the University departments, though made a subordinate feature hereafter, should be retained in some form. The departments might "intervene" at intervals, or in special contingencies.

(VI.) Should not the schools be summoned, in the immediate future, to do something like making propositions from their side, both as to procedure in accrediting and the subjects for matriculation? Under the second branch would fall the subjects to be included, and the flexibleness of the grouping.

Revision of Entrance Requirements.

The Schools Committee is furthermore occupied at the present time in reconsidering the entire plan of entrance requirements for college admission. In order to lock the University more closely together with the schools,—a result which is in every way to be desired,—it is essential that the requirements for admission and the courses in the schools should take cognizance of each other. Not only must the schools seek to conform to the standards and programs of the University, but the University must quite as much respect the actual possibilities and the practical convenience of the schools. The University must seek to utilize what the schools teach; but to the end that this may be done with the minimum of waste and friction, the schools must see to it that they provide a training which does not necessarily find its climax and end at high school graduation. The revision proposed will therefore be made in full consideration of the conditions and necessities of the schools, and the Schools Committee, as the body most intimately informed concerning these conditions and most closely connected with the sources of information, undertakes the task.

It will not at once be possible to bring the two sets of curricula, that of school and that of University, into such close relations to each other that the line of demarcation between the college preparatory courses and other courses in the schools should utterly disappear; but in recognition that it is really training and not subject-matter that the entrance requirements seek to ensure, both parties, school and University, can well afford to approach a good understanding. The projection back upon the schools of the similitude of its own classifications in courses and studies is certainly not a result which the University can desire; it certainly is not desirable that a pupil should be forced to commit himself to the courses he will pursue in college two years or four years before entering. The best articulation between school and college is therefore that which makes the completed work of the schools most nearly available for entrance upon any of the courses of college.

Simplification of Programs.

The completest adjustment is probably at present impracticable, but any approach toward unification of entrance requirements will offer the schools a much-needed opportunity for simplification of their programs,—an opportunity which will be especially welcome to the smaller ones.

Death of Director Keeler.

In the death, on August 12, 1900, of Dr. James Edward Keeler, since 1898 Director of the Lick Observatory, the Observatory, the University, and the science he represented have suffered a loss which can appear to us only as irreparable. He was born at La Salle, Illinois, September 8, 1857, and was therefore at the time of his death in his forty-third year. Until shortly before his last brief illness he appeared to be in the full strength of assured health; his work prospered; his plans for future work were well laid; all the work of the Observatory throve under his oversight; his colleagues toiled gladly with him; the world of science gave its fullest recognition to his labors and their results; all that knew him and watched the interests of the Observatory felt the peace of assurance that all was well on the mountain, and that long years of fruitful work and brilliant results lay before him and the institution over which he so fitly presided. The sense of grief and loss which we all feel beyond the power to tell is echoed back to us in messages of sympathy from all over the scientific world.

Choice of a Successor.

The question of the selection of a successor to Dr. Keeler has been esteemed by the committee of the Board of Regents having the affairs of the Observatory in immediate charge a matter involving so important a trust to the cause of science, that only after fullest consideration, including consultation with the leading astronomical authorities of this and other lands, could any solution be effected. Pending such decision, the administration of the Observatory has been placed in the hands of the senior astronomer, Dr. W. W. Campbell. The report of the Director is appended to this report.

Connection With the Professional Schools.

The character of the connection existing between this University and the professional schools in San Francisco differs with the different schools. The Medical and Dental schools are connected without the intermediation of a special board of trustees; before the close of another year it may be expected that this will be the case with the College of Pharmacy. These three departments now occupy buildings provided by the State, and it is to be hoped will in the near future earn other material advantage from their more intimate association with the University organization.

At present these schools are dependent entirely upon the fees of the students for their support, but this should not continue if the highest efficiency is to be expected of these much needed factors in the educational system of the State. A certain number of the teachers and officers of these schools should be men who devote themselves entirely to teaching. This demands proper salaries. The equipment of the laboratories, libraries, and illustrative collections cannot be left to the meagre yield of the tuition fees. These departments all represent interests which lie close to the well-being of the people of the State, and present objects for private beneficence, as well as public care, as worthy and as attractive as any of the University departments.

Endowed Professorships Needed.

The endowment of a professorship, the provision of a library, the equipment of a laboratory, in any of these schools might well be selected by a public benefactor as the means of serving the public good. Fifty thousand dollars to seventy-five thousand dollars would endow a professorship; four of such are needed for the Medical School alone. Twenty thousand dollars will endow a lectureship.

Mrs. Hearst's Gifts.

The example set by Mrs. Hearst, who has this year given $22,962.97 for the equipment of the work in Pathology and Histology at the Medical school and has made provision for the payment of one of the salaries, is an example to be followed, and which we believe will be followed. The demand for a first rate institution of medical learning and practice belongs among the greatest needs of the Pacific Coast. One such institution would set a standard for all others and would help, and not hinder, them in their development. The buildings which the State has provided are left to the care of the Regents without provision for their repair, their protection from fire, or for the care and improvement of their grounds. The expenditure of $20,000 or $30,000 in these directions is a real need.

A Third Year in Pharmacy.

The Dean of the College of Pharmacy refers in his report to one clear and pressing need of the school, and one that could be met with relatively small means,—the provision of means in the way of material equipment for a third year course of work.

Location of Hastings.

The ultimate decision concerning the location of the Hastings College of the Law will be observed with greatest interest. As a large proportion of its students wish to employ a portion of their time daily in law offices, or in some form of remunerative employment, the argument in favor of location in the heart of the city presses strongly upon consideration. The studies preparatory to the practice of law are, however, with sharper competition and increased professional requirements and standards everywhere among the best schools of the country, developing a seriousness and solidity which demand of the student more complete absorption in his work, longer periods of study, the use of larger collections of books, and the opportunity of a wider range of subjects. The permanent isolation of a law school from that close contact with university courses, libraries, life, and atmosphere which can be obtained only at a university site, is unlikely to afford the means of developing the higher type of legal education,—and it is only that higher type which will suit the rightful demands of our position and the wants and ideals of this community.

Personal Element in Mrs. Hearst's Gifts.

A list of recent benefactions to the University is appended to this report, but it may be permitted that I should call especial attention to some which have a peculiar significance. The benefactions done by the hands of our generous patron, Regent Phœbe A. Hearst, exceed the ability of any list or catalogue to recount; they include things small and great; among them are countless acts of thoughtful sympathy, as well as gifts of substance, they have come to us incessantly; no one has known them all except herself, but all have been dictated by her own direct and personal interest, and their need detected by her own watchful observation. With her gifts has come more of herself than is the wont.

Architectural Competition.

The expenses of the architectural competition, all of which were borne by Mrs. Hearst, have reached up to this date about $110,000. The revision of the plans undertaken by M. Bénard since his visit to Berkeley will involve some added expense. The plans when completed and ready to lay before the Board of Regents, as it is expected they will be in the near future, will have cost somewhat over $115,000.

Hearst Hall.

The cost for the building of Hearst Hall, which was used during the last winter as a place for entertaining, for lectures, for University functions of all sorts, was $28,488.27. This building has now been removed, at a cost of between five and six thousand dollars, to grounds adjoining the University, where it will be created into a gymnasium for the women. The rebuilding, the additions required, and the equipment, will add a considerable sum, probably four or five thousand dollars more, to the cost. The land upon which Hearst Hall is to be located was purchased by Mrs. Hearst at a cost of $11,000, and it is her purpose to transfer this land, as well as the buildings, to the University.

The Hearst Domestic Industries.

Part of the moneys necessary for the extension of the Harmon Gymnasium and for the provision of extra apparatus is due also to her generosity. Her interest in the well-being of the women students has caused her to assist in the creation of two homes, or club houses, in each of which fourteen women find residence. An institution which has been named the Hearst Domestic Industries has been founded in the neighborhood of the University, and provides women who desire it the opportunity of learning the handicrafts of sewing and embroidery, and of incidentally earning a fair return for their work; if the institution succeeds and represents a permanent demand, as it now seems that it does, it is likely that its work will be extended in the direction of teaching cookery and related arts. The institution is of course entirely distinct from the University, but it serves the interests of University students solely, and represents an addition to the facilities and advantages of the place.

Medical Laboratories.

The equipment of a department of pathology, and incidentally of a department of histology and physiology, in the Medical Department constitutes one of the most fortunate and eminent of Mrs. Hearst's donations.

Archaeological Expeditions.

The archæological expeditions which have been undertaken through the generosity of Mrs. Hearst are already beginning to yield their fruitful output of discoveries and material. Nearly one hundred cases of archæological materials are stored in the University buildings, awaiting a proper place for their unpacking and display. Mrs. Hearst has appropriated for the expedition in Egypt, conducted by Dr. George A. Reisner, the sum of $10,000 per year; for that in South America, under charge of Dr. Max Uhle, $3,500 per year; for the excavations and purchases in California, under the charge of Dr. Philip Mills Jones, $6,000 per year, and for the excavations and purchases to be undertaken by Dr. Alfred Emerson in Europe, particularly with reference to Greek and Roman art, $10,000 per year for two years. Taken altogether, Mrs. Hearst's annual contribution to these archæological explorations, which are being conducted in the name of the University of California and for the ultimate benefit of its future Museum of Archæology and Art, is over $30,000 a year.

Scholarships.

Besides the University scholarships which, since 1897, she has annually provided at a cost of $2,400 or more, a number of private scholarships have been awarded by her to University students, and four University graduates are at present studying abroad at her expense.

She has provided for the salary of a woman physician and lecturer in hygiene in Berkeley, and for one of the professorships in the Medical Department in San Francisco; and also for the lectureships of Dr. Alfred Emerson and Professor Louis Dyer.

Sather Chair and Library Funds.

The gifts of Mrs. Jane Krom Sather provide an endowment for a chair in some department of classical literature and the establishment of a fund, likely to amount to at least $15,000, for the creation of a law library at the University, and furthermore a library fund of $10,000 for the purchase of books for the general library. Mrs. Sather has made further provision for the University, the exact extent and details of which are not made public.

Mrs. Sather's Wise Beneficence.

The wisdom which Mrs. Sather displayed in choosing the objects of her beneficence and in giving permanent form to the memorial which she leaves, and the good which she will do, are worthy of all praise and imitation.

Opportunities For Fruitful Generosity.

The needs of the University are so various that it is difficult to summarize them. It is a strong impression which I have received, and which I believe any one acquainted with university education at large would receive, that there is no place in the world where money could be to-day applied for educational purposes where dollar for dollar it would do so much good and be so much appreciated as at the University of California. It has never occurred yet in the history of education that a university has been ruined by the demand for its instruction. The time must come when the rightful claims of this institution will be recognized and met.

Vital Needs— Among the needs of the University for the nearer future I will mention the following:

(1) Library funds to the amount of $500,000.

The Library. (2) A library building suited to modern demands and capable of extension so as to accommodate the library that is certain to be entrusted to the keeping and use of this University.

An Alumni Hall. (3) An alumni hall which shall form the center of the daily social life of the students, alumni, and teachers; the Houston Hall at the University of Pennsylvania furnishes a good model; it is a fortunate thought of our alumni that they have undertaken to provide this building.

An Art Building. (4) An Art Building, which shall furnish shelter for the objects illustrative of art, archæology, anthropology, etc.

Forestry, Irrigation, and Naval Architecture. (5) A School of Forestry.

(6) A department of Irrigation.

(7) A School of Naval Architecture and Engineering. The eminent position which shipbuilding has taken here by San Francisco Bay makes it incumbent upon the University to furnish the best instruction in what has now come to be a characteristic California art.

Music. (8) A department of Music.

Archaeology. (9) A department of Archæology. It will be necessary, in connection with the Art Building, which will include large archæological collections, to employ a number of curators, each of whom should be master in some particular field. The work of these various specialists should be united under the general oversight of the incumbent of the Chair of Archæology.

A School of Architecture. (10) A School of Architecture. The work which is to be undertaken here within the next few years, in accordance with the Hearst Architectural Plans, will furnish the best practical opportunity that could be desired for the development of such a school. It is much to be desired that the one who shall be the supervising architect of these buildings should be at the same time the head of the school of architecture.

(11) A laboratory for a department of Dairy Husbandry.

Laboratories, Lectureships, and Professorships.

(12) A department of Physical Chemistry as part of the general department of Chemistry. This would require at the first an assistant professorship only.

(13) An instructor or professor of the Art of Speaking, to be connected with the English Department.

(14) Instructors or professors of the Spanish Language and Literature, of the Russian Language and Literature, and of general linguistics.

(15) Lectureships and professorships for the School of Commerce.

Respectfully submitted,

BENJ. IDE WHEELER,
President of the University.

SUBSIDIARY REPORTS.

DIRECTOR OF THE LICK OBSERVATORY.

PRESIDENT OF THE SAN FRANCISCO ART ASSOCIATION.

DEAN OF THE HASTINGS COLLEGE OF THE LAW.

DEAN OF THE MEDICAL DEPARTMENT.

SECRETARY OF THE BOARD OF TRUSTEES OF THE POST-GRADUATE MEDICAL DEPARTMENT.

DEAN OF THE DENTAL DEPARTMENT.

DEAN OF THE COLLEGE OF PHARMACY.

DEAN OF THE VETERINARY DEPARTMENT.

LIBRARIAN.

LICK ASTRONOMICAL DEPARTMENT.

(LICK OBSERVATORY.)

Mt. Hamilton, July 1, 1900.

To the President of the University,

Sir:—The report which I have the honor to submit herewith embodies my second annual report as Director of the Lick Observatory, for the year ending September 1, 1899. In general, the record of the scientific work accomplished at the Observatory is for the year covered by my annual report, but in some important cases it has been brought up to the present date. I have thought it desirable to consider at some length the scientific activity of the Observatory, as this is a subject which was passed over lightly in my report of the preceding year.

ORGANIZATION OF THE LICK OBSERVATORY.

Benj. I. Wheeler, *President of the University.*

James E. Keeler, *Director and Astronomer.*
W. W. Campbell, *Astronomer.*
R. H. Tucker, *Astronomer.*
W. J. Hussey, *Astronomer.*
C. D. Perrine, *Assistant Astronomer and Secretary.*
Robert G. Aitken, *Assistant Astronomer.*
W. H. Wright, *Assistant Astronomer.*
E. F. Coddington, *Fellow.*
R. T. Crawford, *Fellow.*
H. K. Palmer, *Fellow.*

John Macdonald, *Foreman and Machinist.*
J. L. Bane, *Carpenter.*
E. Zengeler, *Instrument-Maker.*
W. C. Pauli, *Janitor.*
N. D. Soto, *Laborer.*
Paul Soto, *Laborer.*

When I took charge of the Observatory in 1898, there was a vacancy caused by Professor Schaeberle's resignation. It was thought best not to fill this vacancy at once, but to appoint three Fellows in Astronomy, who should hold office for one year, or so long as the vacancy above-mentioned should exist. In order to bring about a closer relationship between the two astronomical departments of the

University, it was decided that the new Fellows should be graduates of the University of California recommended by the Director of the Students' Observatory at Berkeley. Messrs. Crawford, Ross, and Palmer were accordingly appointed on July 12, 1898, and assumed the duties of their positions on August 1st. Mr. Ross resigned his Fellowship in 1899 on account of failing eyesight, and owing to the general financial stringency at the University, his place has not been filled. As the need for assistance at the Observatory is very great, it is to be hoped that this Fellowship can be restored in the near future, thus carrying out the purpose for which these Fellowships were originally created.

BUILDINGS AND GROUNDS.

All the Observatory buildings are in good condition, although, with only one janitor, it is hardly possible to keep them in as neat order as is desirable. Repairs have been made from time to time, as required. Two rooms have been added to the cottage occupied by Mr. Aitken, replacing a part of the building which had begun to give way under the stress of the winter weather. Another cottage has had one room added. The Crossley Dome has been painted, and other painting has been done where necessary.

A photographic laboratory of brick, to replace the small wooden building which is now used in connection with the photoheliograph, and which becomes so hot in summer that ordinary photographic operations cannot be carried on in it, is badly needed. It can probably be built entirely from our own resources.

The various retaining walls around the Observatory, which are made of the stone taken from the summit of the mountain in building, are crumbling to pieces, and in many places have fallen down. They will be replaced as soon as possible by walls of brick. One retaining wall, about 13 feet high at its highest part, surmounted by an iron railing, has been built north and east of the Meridian Circle House during the present summer (1900).

BRICK BURNT ON MT. HAMILTON.

To provide the brick for the purposes mentioned above, I was authorized by the Board of Regents to burn a kiln of brick at the brickyard below the summit of Mt. Hamilton. The contract was awarded to Mr. George B. Jackson of San José. One large kiln of 300,000 bricks was made and burned during the summer of 1899, the Observatory supplying the water by pipes from its reservoirs on the mountain. The brick are at least equal in quality to any that have been made here, while the price was materially lower than prices which have been paid heretofore.

RESERVOIRS AND WATER SUPPLY.

During the summer season it occasionally happens that for several days there is not sufficient wind to turn the windmills at the Huyghens reservoir. Hence the water from the hydraulic rams and engine of the large dome overflows and is lost. To provide for these occasions the storage capacity of the Huyghens (lower) reservoir has been increased by building four tanks, having a total capacity of 21,000 gallons. These tanks were made at the Observatory. No other change has been made in the water system. About 60,000 gallons of water were supplied to the workmen at the brickyard.

The wooden covers of all the reservoirs have become decayed, so that dirt and small animals find entrance to the water. New roofs will be built, if possible, during the present summer.

THE WILLIAM H. CROCKER ECLIPSE EXPEDITION.

By the generosity of Mr. William H. Crocker, of San Francisco, the Lick Observatory was enabled to send a party to Georgia, to observe the total solar eclipse of May 28, 1900. Only two observers (Dr. Campbell, in charge of the expedition, and Mr. Perrine) were sent from Mt. Hamilton, but the party was joined in the East by several experienced astronomers, including Messrs. Nyland and Wilterdink, of Utrecht, and Mr. H. D. Curtis, formerly of the University of the Pacific. In all, there were fourteen assistants. The Southern Pacific Company kindly gave us special rates for both passengers and freight.

The instrumental equipment of the expedition was quite complete. The principal instrument for photographing the corona was the five-inch telescope, of forty feet focal length, which had been used by the Lick Observatory parties in South America and India. For photographing the corona on a smaller scale there were several cameras of from five to six inches aperture and others of smaller size. The equipment also included two spectrographs and apparatus for the observation of contacts.

The station occupied was Thomaston, a small town near Atlanta. During totality, which lasted only eighty-five seconds, the extensive program of the party was carried out with substantial success. The large photographs taken with the forty-foot telescope are very fine, and most of the smaller ones are excellent. The spectroscopic results, on the other hand, are poor. It will be some time before all the results can be made known.

After the eclipse, Messrs. Campbell and Perrine attended the meeting of the Astronomical and Astro-physical Society of America, in New York.

INSTRUMENTS, AND SCIENTIFIC WORK OF THE OBSERVERS.

The nature of the scientific work undertaken at the Lick Observatory is determined by such considerations as the unusually fine atmospheric conditions which prevail here, the nature of the instrumental equipment, and the number of observers on the staff. The general policy of the Observatory is to carry on investigations which cannot be pursued to so great advantage elsewhere. Thus, comets which are bright enough to be easily seen at the leading observatories receive only occasional attention, while comets which by reason of their faintness or unfavorable position are difficult of observation are followed as closely as possible. Elaborate investigations dealing with large masses of data, and requiring a large force of computers, can only be undertaken by richly endowed observatories, or by those which receive government assistance. The Lick Observatory makes the most of its natural advantages; and extended theoretical researches, which can be made as well in a city as at a fine observing station, do not form a part of our general plan.

As all the principal instruments of the Observatory are used on practically every clear night, the amount of work accomplished is very considerable, notwithstanding the smallness of the observing force, while the variety of instruments makes the field covered quite a wide one.

THE THIRTY-SIX-INCH REFRACTOR.

This splendid instrument is in perfect order. A small periodic error originally in the driving gear has been almost wholly corrected by Dr. Campbell (who has charge of the instrument), by introducing into the clock-train a periodic error of equal amount but opposite sign, so that the two errors neutralize each other.

About half the time of the 36-inch equatorial is devoted to spectroscopic determinations of the motions of stars in the line of sight, with the aid of the Mills Spectrograph. This department of the scientific work of the Observatory, which is probably as important as any work that can be done at the present time with a large telescope, has been admirably systematized by Dr. Campbell, who is assisted in the observations and reductions by Mr. Wright. The probable error of a single determination is only about 0.25 kilometer for the best stars, a degree of accuracy which has never before been reached in such measurements. A correcting lens, which is placed in the cone of rays from the 36-inch objective, and which changes the chromatic aberration of the telescope so as to adapt it to photographic work, has added somewhat to the accuracy and very much to the convenience of the observations.

During the past year 522 spectrograms were obtained. Over 200 spectrograms were definitively, and about 500 approximately, measured and reduced.

In connection with this work, the following stars have been found to have variable velocities in the line of sight, and therefore to be revolving stellar systems:

η Pegasi, χ Draconis, o Leonis, ξ Geminorum, ι Pegasi, θ Draconis, ϵ Librae, β Capricorni, h Draconis, λ Andromedae, ϵ Ursae Minoris, ω Draconis, α Ursae Minoris, α Aurigae, v Sagittarii. This list is constantly growing.

From twenty-five to thirty spectrograms of each of these stars are needed for determining their orbits. The observations of several of them are essentially complete, and the others are being observed as rapidly as circumstances will permit. An investigation of the orbit of η Aquilae, based on all the available data, has been made by Mr. Wright, who has also partially computed a set of tables for facilitating the reduction of spectroscopic observations.

Two of the stars in the above list are of special interest. In the case of Polaris the velocity in the line of sight has a double period;—a short oscillation, having a range of four miles per second and a complete period of three days twenty-three hours, is superposed on a much longer one, the period of which has not yet been determined, though it is probably as much as several years. The star is therefore part of a triple system, two of the bodies being dark. Capella, or α Aurigae, has a double spectrum. The two sets of lines undergo a periodic relative displacement.*

To aid in the observations and reductions, in this important part of the Observatory's work, another assistant is greatly needed. It is a severe strain on both the present observers to keep the work in as satisfactory a state as it is at present.

A special study by Dr. Campbell of the triple hydrogen lines in the spectrum of o Ceti led to many interesting results.

The thirty-six-inch telescope has also been used for other spectroscopic investigations. The spectra of all sufficiently bright comets have been photographed by Mr. Wright. Observations of nebular spectra have been made by the Director, and others. A comparison of the spectrum of hydrogen in a Geissler tube with the spectrum of hydrogen in the Orion Nebula, by methods devised by Messrs. Campbell and Wright, led to some interesting results which have been published, with other spectroscopic papers, in the *Astrophysical Journal*.

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* This discovery was made independently, and nearly simultaneously, by Mr. Newell, of Cambridge, England.

For the remaining half of the time the telescope has been used for micrometric work by Mr. Hussey, Mr. Perrine, and Mr. Aitken, and occasionally by other observers. Series of observations of the satellites of Neptune and Mars have been made by Mr. Hussey; of the satellites of Neptune and Uranus by Mr. Aitken. A hundred and fifty sets of measures of planetary nebulae, for parallax, and a set of measures for determining a possible refractive effect on stars by the head of Swift's comet, have been made by Mr. Perrine.

The thirty-six-inch telescope is also used for the observation of comets, and sometimes, particularly in the case of expected comets, for purposes of discovery. Thus Wolf's periodic comet was discovered by Mr. Hussey, and Tempel's second periodic comet and Holmes' periodic comet were discovered by Mr. Perrine, with this telescope. In the course of his cometary observations, Mr. Perrine has found one close double star and about thirty new nebulae. The formation of a second nucleus in the head of Swift's comet was also discovered by him, on May 11, 1899.

Double stars are regularly observed with the thirty-six-inch telescope, but they will be considered in connection with the smaller (twelve-inch) instrument.

THE CROSSLEY THREE-FOOT REFLECTOR.

After many experiments, changes and minor improvements, this telescope has been brought into excellent working order. It is in the personal charge of the Director, who is assisted by Mr. H. K. Palmer. It will be used for various astrophysical researches, and more particularly for the photography of nebulae, for which purpose it has proved to be admirably efficient.

Some of the improvements which have been made are as follows: The pier has been cut down two feet, greatly increasing the facility with which the instrument can be handled. A new and powerful driving-clock has been made by the Observatory instrument-maker, from designs by Mr. Hussey. The double-slide guiding apparatus and the slow motions have been repaired and improved, and electric illumination provided for the former. Wires for electric lighting and for telephone communication have been run to the main Observatory. The study and the photographic room have been fitted up in a convenient manner for work. A very rigid declination clamp has been added to the mounting. The observing slit in the dome has been fitted with an adjustable wind-screen, on the general plan of the one used at the Yerkes Observatory.

The interior walls of the dome have been painted bright red; the inner surface of the dome itself, black. By means of a large red lamp on a movable stand, the interior is sufficiently lighted for the convenience of the observers, without danger of fogging the sensitive plate. These precautions are necessary, because the "tube" of the Crossley reflector is merely a framework of iron rods, which does not exclude the light like the tube of an ordinary telescope.

Observation with the Crossley reflector is subject to more limitations than observations with the other instrument. Work cannot be pursued on moonlight nights, in slightly foggy or even in damp weather. Nevertheless, about seventy photographs have been made of forty different nebulæ and star-clusters, mostly with long exposures of from three to four hours each, and from the most interesting of these positive enlargements have been made on glass. The definition of these photographs, and the amount of detail shown by them, are surprising. Many new features are shown, and some general conclusions of the highest interest have already been drawn. From one to sixteen new nebulæ have been found on nearly every plate exposed, and I hrve estimated that the number of new nebulæ in the sky, within reach of the Crossley reflector, may be something like 120,000. A set of photographs made with the Crossley telescope was exhibited at the conference of astronomers recently held at the Yerkes Observatory, and has since been presented to the Royal Astronomical Society. Another set has been sent to the Royal Astrophysical Observatory at Potsdam.

An investigation of the distribution of stars in the Great Cluster in Hercules, by means of a photograph taken with the Crossley telescope, has been made by Mr. Palmer.

Following a method which I proposed some years ago, the Crossley telescope has been used to produce photographs of the Great Nebula in Orion, by means of the less refrangible rays of the spectrum, which are directly comparable with drawings. The results are in confirmation of earlier spectroscopic observations made here, and may be regarded as an extension of the spectroscopic method to parts of the nebula which are too faint for visual observation.

THE TWELVE-INCH REFRACTOR.

This instrument is in charge of Mr. Hussey, who is assisted by Mr. Coddington. A most important part of its work, as well as of that of the thirty-six-inch telescope, is the measurement and discovery of double stars, for which purpose the conditions on Mt. Hamilton are especially suitable. Mr. Hussey is at present engaged in the remeasurement of all the Otto Struve stars, or double stars discovered at the

Pulkowa Observatory. About 2,000 measures had been made, in connection with this work, up to September 1, 1899.

The number of measures of double stars made during the past year is as follows: by Mr. Hussey 996; by Mr. Aitken 976. Mr. Aitken's list includes nearly all the rapid binary systems.

A systematic search for new pairs has been made by Mr. Hussey, mainly with the thirty-six-inch refractor, within the zone 10° to 14° south declination. Thirty-six new pairs were found during the past year, most of them very close, the distance in two cases being only 0.″15.

The zone between 2° and 10° south declination has been examined in a similar manner, with the twelve-inch equatorial, by Mr. Aitken. About fifty pairs were found between April 1 and September 1, 1899. To guard against errors, each new pair has been examined with the thirty-six-inch telescope on at least one night. Only close stars brighter than the ninth magnitude are included in these lists.

With both equatorials the following complete sets of comet observations have been made during the year ending September 1, 1899:

Comet.	No. Obs. and Observer.
1898 I (Perrine)	21, Perrine
1898 IV (Wolf)	8, Hussey
1898 VII (Coddington)	9, Coddington
1898 VIII (Chase)	1, Aitken; 36, Coddington
1898 IX (Perrine)	20, Perrine
1898 X (Brooks)	19, Hussey
1899, *a* (Swift)	7, Hussey; 17, Perrine
1899, *b* (Tuttle)	13, Perrine
1899, *c* (Tempel II)	2, Hussey; 10, Aitken 31, Perrine
1899, *d* (Holmes)	5, Aitken; 9, Perrine.

Total number of comet observations, 208.

At the request of Professor Simon Newcomb, the asteroids discovered by Professor James C. Watson have been observed for the National Academy of Sciences. The work has been done by Mr. Coddington. In general, ephemerides were computed from the data given in the *Berliner Jahrbuch*. The region indicated by the ephemeris was photographed with an exposure of one hour or more with the Willard six-inch lens, and the asteroid identified on the negative by the trail caused by its proper motion. It was then observed with the twelve-inch telescope. All the Watson asteroids (except the one that is "lost") have been rediscovered and observed in this way. From three to five observations have been made of each. In the course of the work Mr. Coddington discovered two new asteroids: (439) Ohio, and (440).

Thirty-seven observations of ten other asteroids have been made by Mr. Coddington, seventy-nine observations of five asteroids by Mr. Hussey (including sixty-five observations of the new planet Eros), and ten observations of two asteroids by Mr. Palmer. An exceedingly faint new asteroid (1899 FD) was discovered with the Crossley Reflector in December, 1899. It is the smallest asteroid known at the present time.

THE SIX-AND-ONE-HALF-INCH MERIDIAN CIRCLE AND THE FOUR-AND-ONE-HALF-INCH TRANSIT INSTRUMENT.

The Meridian Instruments are in charge of Mr. Tucker, who is assisted by Mr. Crawford. The transit instrument has been little used, as the clock corrections for the time-service have been furnished by the meridian circle.

During the year ending September 1, 1899, 6,000 observations on 106 nights have been made with the meridian circle, mostly of southern stars from the catalogue of Piazzi. In addition to these, observations for a study of the refraction were made during two months, by Mr. Crawford, who has also been regularly employed in computation. The reductions have been carried through the early stages for all the observations of the Piazzi stars, and have been completed for about 1,000 observations. A few miscellaneous observations of comparison stars and asteroids have also been made.

The complete edition of volume IV of the Publications of the Lick Observatory, containing Mr. Tucker's meridian circle results from 1893 to 1896, has been received from the State Printing Office, and is ready for distribution.

THE CROCKER PHOTOGRAPHIC TELESCOPE (SIX-INCH WILLARD LENS.)

This instrument, in charge of Mr. Coddington, has been employed mainly in the rediscovery of the Watson asteroids. Photographs have also been made of nebulæ, and of comets 1899 *a* (Swift) and 1898 X (Brooks). At the request of Professor Bredichin, a set of positives from these photographs of comets, and of those taken with the other six-inch photographic telescope, was sent to the Imperial Academy of Sciences of St. Petersburg.

THE FLOYD TELESCOPE, AND SIX-INCH PORTRAIT LENS.

These two instruments, which are carried by the same equatorial mounting, have been in charge of Mr. Palmer, who has employed them, at such times as could be spared from other duties, in photographing the extended nebulosities of Herschel; also, in photographing other nebulous regions, in connection with the work of the Crossley reflector. Photographs were also made of comet 1899 *a* (Swift,) and 1898 X (Brooks).

THE BRUCE SIX-AND-ONE-HALF-INCH COMET SEEKER AND THE FOUR-INCH COMET SEEKER.

The comet seekers, in charge of Mr. Perrine, have been constantly employed. For two months during the summer of 1899 they were used by Mr. Crawford.

The comets discovered at Mt. Hamilton during the year ending September 1, 1899, were

Comet 1898 IX	Perrine, September 12, 1898.
Comet 1899 *c* (Temple II)	Perrine, May 6, 1899.
Comet 1899 *d* (Holmes)	Perrine, June 10, 1899.

In the year ending September 1, 1898, six comets were discovered at Mt. Hamilton.

THE PHOTOHELIOGRAPH.

Two photographs of the sun are taken with this instrument every clear day, and the negatives are stored for future reference. The work has been done by Mr. Pauli, the Janitor.

THE SEISMOGRAPHS.

The seismographs, in charge of Mr. Perrine, are always kept in adjustment. A spare seismograph has been loaned to the United States Observatory at the Mare Island Navy Yard, on the condition that records and reports of earthquake shocks shall be sent to Mt. Hamilton. Several observers, mostly in the neighborhood of San Francisco, also kindly send reports. The collected results are published yearly by the United States Geological Survey.

METEOROLOGICAL INSTRUMENTS.

Meteorological observations are made three times daily. Monthly summaries are furnished to the United States Weather Bureau. The daily records of the self-recording instruments are filed for future reference.

The time-service has been conducted as heretofore.

MISCELLANEOUS OBSERVATIONS AND COMPUTATIONS.

The Leonid meteors were observed and charted by several members of the Observatory staff, in November, 1898. The results were sent to Harvard College Observatory for discussion in connection with other data.

The reduction of Mr. Schaeberle's meridian observations has been in the hands of Mr. Aitken. During the year the Right Ascension and Mean Place reductions were completed, the separate observations made in each year were collated and the discrepancies removed. The Coast Survey stars were reduced to the epoch 1880, the observations of different years collected, and the final places checked by comparison with other catalogues. The Struve stars are now being reduced to the epoch 1880, and the entire work will be completed during the present year.

Two orbits and ephemerides for comet 1898 IX (Perrine) were computed by Mr. Perrine.

Elements and ephemerides for comet 1898 V (Giacobini) and for comet 1898 X (Brooks), and elements for comet 1899 *a* (Swift) were computed by Mr. Hussey.

The definitive orbit of comet 1896 III (Swift) was computed by Mr. Aitken.

An orbit and ephemeris for comet 1898 VIII (Chase) were computed by Mr. Coddington and Mr. Palmer.

A computation of the definitive elements of comet 1897 III (Perrine) is being made by Mr. Palmer.

Orbits and ephemerides of the new asteroids (439) and (440), and ephemerides for most of the Watson asteroids, were computed by Mr. Coddington. Elements for the Crossley asteroid 1899 FD were computed by Mr. Palmer, and by Mr. Phipps of the Students' Observatory.

Two sets of elements for the planet Eros, and circular elements of the asteroids (439) and (440) were computed by Mr. Hussey.

Announcements have been telegraphed to Harvard College Observatory, for distribution, at various times.

Measurements of the wave-lengths of lines in the spectra of third type stars, and of the positions of nebulæ on plates taken with the Crossley Reflector, have been made by Mr. Palmer.

A report on the Crocker Eclipse expedition to India is being prepared by Dr. Campbell. The report on the recent eclipse will be included in the same volume.

THE LIBRARY.

The library has been in charge of Mr. Aitken. The Librarian of the University, at Berkeley, has very kindly and promptly sent such books as have been needed here for reference.

HONORARY DEGREES, ETC., CONFERRED ON ASTRONOMERS OF THE LICK OBSERVATORY.

The honorary degree of M.S. was conferred upon Mr. W. W. Campbell by the University of Michigan, in June, 1899, and the degree of D.Sc., by the Western University of Pennsylvania, in June, 1900.

The Director was elected a Foreign Associate of the Royal Astronomical Society (of which he had previously been a Fellow) on December 9, 1898.

The Director was elected a member of the National Academy of Sciences, on April 19, 1900.

The Draper Gold Medal was awarded to the Director, for his astrophysical researches, by the National Academy of Sciences, at its annual meeting in 1899.

Financial statements will be found, as heretofore, in the report of the Secretary of the Board of Regents.

Respectfully submitted,

JAMES E. KEELER,
Director of the Lick Observatory.

[NOTE.—The University suffered an irreparable loss in the death on August 12, 1900, of Director James E. Keeler. The preparation of the foregoing report was one of Dr. Keeler's last official acts. The Lick Observatory is temporarily under the direction of Dr. W. W. Campbell.]

SAN FRANCISCO ART ASSOCIATION.

(MARK HOPKINS INSTITUTE OF ART.)

SAN FRANCISCO, July 9, 1900.

To the President of the University.

SIR:—I have the honor to submit the following report of the San Francisco Art Association for the period included between the last biennial statement (October 26, 1898) and the present date.

BUILDINGS AND GROUNDS.

The period referred to has been especially notable for the acquisition by the Association of a properly equipped picture gallery, the lack of which has been for many years a serious detriment to the development of the best interests of art in this city. For this valuable improvement we are indebted to Mr. Edward F. Searles, to whose public spirit, love of art, and generosity, the Art Association and this city and State already owe so much. This structure was erected in memory of the late wife of Mr. Searles, whose name it bears. It was begun in May, 1899, and completed in February, 1900, Mr. E. R. Swain being the architect.

The gallery extends along the west side of the main building and is of the same general style of architecture. Its interior is forty-three feet wide and one hundred and five feet long, the walls having a height of twenty-two feet, of which fifteen feet is picture space. It is lighted during the day by a sky light twenty feet wide by eighty feet long, and at night by powerful electric reflectors constructed especially for the purpose. The small water-color room on the second floor of the main building opens into the gallery from the north wall with a balustrade giving it a balcony appearance. Lobby, office, and storeroom complete the appointments of this admirable addition.

Repairs and alterations have been made as follows: The entire exteriors of the Institute and school buildings have been repaired and painted in the most thorough manner; the walls of three of the large rooms and the house gallery have been recovered with a material better suited to the display of pictures, rendering these apartments harmonious adjuncts to the Mary Frances Searles Gallery, into which they open; the photogravure room on the second floor, and an additional room made necessary by the increase of the collection of prints, have been newly painted and finished in a style more befitting their purpose. All of these repairs and alterations, and various minor ones, have been made under the direction and through the liberality of Mr. Searles.

EXHIBITIONS, RECEPTIONS, ETC.

October 13, 1898, Fall Exhibition by resident artists, including Thursday evening musical receptions; six weeks.

May 17, 1899, exhibition of works of School of Design; three days.

December 14, 1899, loan exhibition of paintings by famous artists, including Thursday evening musical receptions, one week.

Same date, competition poster exhibition, by pupils of the School of Design.

January 25, 1900, loan exhibition of bronzes and earthenware vases, including Thursday evening musical receptions; one week. Also free day for the public.

March 22, 1900, Spring Exhibition by California artists, including Thursday evening musical receptions; five weeks, also free day. The total attendance during this latter exhibition, which opened the Mary Frances Searles Gallery, was 12,202.

May 15, 1900, exhibition of works of School of Design; three days.

The following receptions and entertainments were also held: February 14, 1899, annual ball of the Association; May 5, 1899, reception to Captain Robert Howe Fletcher, on his installation as Curator of the Association; October 6, 1899, reception to President and Mrs. Benj. Ide Wheeler, by the students of the University; October 27, 1899, reception to President and Mrs. Daniel C. Gilman, Johns Hopkins University, by the Regents of the University; March 23, 1900, Charter Day reception to President and Mrs. Benj. Ide Wheeler, by the Alumni of the University; February 27, 1900, annual ball.

Lectures in the University Extension Courses, free to the public, have been given in the Institute during the term, under the management of the University; two rooms have latterly been devoted to this purpose.

FREE DAY.

The day on which the public is admitted free to the Institute was originally the first Friday in each month; during 1898 this day was changed at the request of the California Club to Sunday, as being a day on which the working classes were more likely to avail themselves of the privilege. But after a trial of nine months it was found the attendance had diminished very considerably as compared with the week day, and it was accordingly decided to restore the first Friday in the month as being best suited to the wants of the people. The attendance on free day has averaged during the preceding year 1,500 to 2,000; for various reasons it is increasing largely during the present year, the records showing an attendance during the last five months of 12,305 or an average of 2,461 for each free day.

LIBRARY AND LITERATURE.

The library has not been increased as much as its importance deserves, the number of volumes being practically the same as at the last report, 450. An improvement which is much appreciated by the students and visitors is the creation of a magazine and periodical department containing all of the principal periodicals in the various fields of art.

The Institute has undertaken the publication of an illustrated quarterly magazine entitled the *Mark Hopkins Institute Review of Art*, which it issues free to members of the Association, and which will also be for sale. This magazine devotes itself principally to the interests of art in San Francisco and California, and incidentally to the Pacific Coast. It is conducted by the Curator of the Institute.

GIFTS.

The following are works of art which have been presented to the Association during the past two years:

From Mr. Edward F. Searles: a collection of fifty photogravures of portraits by Holbein, and a similar collection of reproductions of famous paintings, also a framed photograph of Pine Lodge, Methuen, Mass.

From Mr. Collis P. Huntington the following oil paintings: "Escape of the Smugglers," by James Hamilton; "Salmon," by Samuel M. Brookes; "Summer Landscape," by Julian Rix; "Summit of the Sierras," by William Keith; "Still Life," by William Harnett.

From Mr. Joseph D. Grant: a collection of eighty-nine Braun photographs of famous paintings.

From Mr. and Mrs. George P. Crocker: a group of marble statuary entitled the "Flight from Pompeii," by Benzoni.

From the heirs of the late Jacob C. Johnson: "Farragut Passing the Forts at New Orleans," by M. F. H. de Haas.

The following books and pamphlets have been received:

From an unknown friend: "The Art Life of William Morris Hunt;" from the Channing Auxiliary: "A California Idyl;" from the Park Commissioners, their Annual Report, and from Mr. Edwin Deakin, "Twenty-one Missions of California."

MEMBERSHIP.

During the past year eighty-five new members have been added to the rolls, making the largest addition in any one year since 1891, a gratifying evidence of the increased interest taken in the work of the Association. The total membership is now 624.

CURATOR OF THE INSTITUTE.

On April 25, 1899, the Board of Directors created the office of Curator. The duties of the Curator are administrative, and include a general superintendence of the affairs of the Association, the School, and the Institute. Captain Robert Howe Fletcher was appointed to the office.

THE CALIFORNIA SCHOOL OF DESIGN.

The school has maintained its high standard as shown by the quality of its annual exhibitions and by the increased attendance, notably the Saturday Class. The average attendance for 1898–99 was 135, for 1899–1900, 152. For the better practical working of the school and in view of its affiliation with the University it was deemed advisable at the beginning of the last school year to remodel it somewhat more on University lines. That is to say, the departments were more definitely outlined and each placed in the charge of an instructor upon whom was conferred, with the approval of the Board of Regents, professorial rank in accordance with the importance of the office. The plan has proved successful not only in the better work accomplished, but in the more economical administration of the affairs of the school. Certain additional courses have been added, notably a lecture course on the History of Art, of which the Curator has been appointed Honorary Professor, and a course on Historical Ornament and Decorative Design; these latter are made contingent upon the number of applicants for the courses warranting the formation of classes. In the modeling department, instruction was given during the last year in casting, a special instructor being employed for the purpose, with excellent results.

Respectfully submitted,

James W. Byrne,
President of the San Francisco Art Association.

HASTINGS COLLEGE OF THE LAW.

(LAW DEPARTMENT, UNIVERSITY OF CALIFORNIA.)

San Francisco, July 6, 1900.

To the President of the University,

Sir:—The past year of the Hastings College of the Law may be considered to have been a fairly good one. The total number of students in attendance was one hundred and seven, of which number twenty-five were in the senior class. Of these twenty-five, twenty-one were recommended for the degree, and pursuant to such recommendation the degree was conferred upon them. The attendance throughout the year was substantially good, and the work in the main was faithful and intelligent.

The greatest need of the College is an additional instructor; but with the present endowment it appears to be doubtful whether such a need can at present be met.

Another need is a library. It is true that the students have the use of the San Francisco Law Library—one of the best of its kind in the United States—but it must go without saying that every law college should have its own law library, and that until it does so it lacks one of the greatest essentials of such a college. I am of the opinion that at least the nucleus of such a library is within the probabilities of not a very distant future.

Respectfully submitted,

Edward R. Taylor,
Dean of the Hastings College of the Law.

MEDICAL DEPARTMENT.

San Francisco, November 24, 1900.

To the President of the University,

Sir:—In accordance with your request I have the honor to make the following report of the progress and needs of the Medical Department of the University. At the time the last report was made the Department had not as yet been weaned from the old plan in accordance with which medical instruction was, in a great measure, purely didactic. The student was expected to accept the dicta of his instructor. The most notable advancement in the Medical Department, therefore, has been the equipment of the laboratories devoted to Histology, Physiology, applied Chemistry, Morphological Pathology, Chemical Pathology, and Bacteriology.

The Histological Laboratory was occupied for the first time at the opening of the present session. The laboratory is now supplied with fifty Bausch and Lomb microscopes of the latest pattern, each instrument having a triple revolver, a two-thirds and one-fifth objective and a one-twelfth oil immersion lens; a number one and a number two eye-piece; the stage having an accessory sub-stage condenser and iris diaphragm. The microscopes are kept in separate lockers, each student having exclusive use of a microscope. Separate lockers are also provided in which the students keep their apparatus and reagents. There are five student microtomes, besides a large-sized Bausch and Lomb microtome and two large paraffin ovens.

At the time of the last report there was absolutely no apparatus for drill in experimental Physiology. The laboratory is now fitted up with all the appliances necessary for class exercises. The best apparatus obtainable has been purchased from the Cambridge Scientific Instrument Company and the Chicago Laboratory and Supply Company. There is sufficient apparatus for individual experimentation for a class of forty students. The equipment includes myographs, kymographs, manometers, sphygmographs, onkometers, cardiographs, Bowditch interrupting clock, spring and pendulum myographs, continuous tracing kymographs, dog and rabbit holders, etc.

During the past year there have been added to the Chemical Laboratory twelve microscopes, six Staudinger balances of the most approved pattern; six sets of analytical weights, gold plated; five hundred test tubes; fifty upright stands for the laboratory desks; five copper dryers with burners; two laboratory tables with drawers, lockers, numerous burettes, flasks, etc.

The laboratory for Morphological Pathology has been rebuilt. Fifty individual microscope-lockers and sixty-five individual apparatus lockers have also been installed. The desks have been fitted up for microscopical work and provide capacity for fifty students. Nearly one thousand dropping bottles and an equal number of tissue bottles have been purchased, so that with the equipment donated by Mrs. Hearst the laboratory is now in first-class condition.

The laboratory devoted to Bacteriology has been equipped so that accommodations have been provided for simultaneous microscopical and cultural work for thirty students. This, with the equipment donated by Mrs. Hearst, makes it possible for the Department to give a very extensive course of instruction in Bacteriology.

Before the opening of the present session a laboratory was built at a cost of $1,500, to be devoted to Chemical Pathology. It contains individual desks with lockers, gas, water and vacuum pipes. The laboratory has five large hoods, two devoted to steam water-baths, with individual compartments for each student, one for the Kjedahl apparatus, one for the blast, one for hydrogen and carbon dioxide, and one for sulphuretted hydrogen. There is accommodation for fifty students. This equipment, together with a portion of the apparatus donated by Mrs. Hearst, presents the foremost laboratory of Chemical Pathology for undergraduate instruction in America.

A most valuable gift has been made to the Department by Mrs. Hearst. Through her generosity it has been possible to provide the laboratories of Histology, Pathology, and Bacteriology with a complete equipment of microscopes of the most approved pattern. Numerous appliances and apparatus of all kinds for laboratory work and instruction are included in the gift. Apparatus has also been provided whereby a large laboratory has been equipped for original research by members of the staff. Opportunity is also provided for such practitioners as may wish to make original investigations of the science of Pathology that forms the very corner stone of practice of medicine.

During the present session there are enrolled 159 students, classified as follows: 37 seniors, 45 juniors, 41 sophomores, 34 freshmen, and 2 special students.

There is an urgent need for adequate means for fire protection of the buildings usually called the Affiliated Colleges. A fire starting in any of these buildings or in the woods back of the grounds would probably mean the total destruction of all of the College property. Stand-pipes should be placed on each building and a steel tank of large capacity should be placed in the rear of the buildings.

About $15,000 or $20,000 is needed for the construction of a retaining wall and the improvement of the grounds about the buildings.

Unfortunately, the sole source of income has been the fees paid by students. By a resolution of the Board of Regents, these fees are granted to the professors in lieu of salary. Instead of so using them, the Faculty has pursued the unselfish policy of devoting all of the available resources of the institution to the maintenance and equipment of the Department.

The science of medicine has become so complex that it is absolutely essential that many of the departments should be in the hands of non-practitioners. It is impossible for a physician actively engaged in the practice of medicine to teach the fundamental subjects in a medical course satisfactorily. Efficient instruction and original investigation in these subjects are possible only when the instructors devote their entire time to their College work. While the Faculty as a whole serves without compensation, it devotes a certain proportion of its income as a fixed compensation to the instructors in Anatomy, Histology, Chemistry, Pathology and Bacteriology.

It has been the misfortune of the Medical Department that it was established as a private institution. It became an integral Department of the University, when, in fact, the University was a mere experiment. Furthermore, no one thought of a University except as a place for pure academic culture. I venture to suggest, now that University ideals have so completely changed, when the University is expected to be a leader in all things that make for the material, intellectual, and moral advancement of the State, that it is time for the University to realize that its active support and earnest care should be given freely to its Department of Medicine.

If it is a true function of the University to cultivate the sciences whose practical application increases the material wealth of the community, it must also be its duty to foster the study of the causation and processes of disease, that the health of the people may be conserved and their lives prolonged.

It is from the achievements of its graduates in medicine that the University must look for much of its fame and glory. There is no way in which the University can make better return to the people for the people's generosity to the University than in fostering that science whose aim is the preservation of the health and lives of the people.

Respectfully submitted,

A. A. D'Ancona,

Dean of the Medical Department.

POSTGRADUATE MEDICAL DEPARTMENT.

(SAN FRANCISCO POLYCLINIC.)

San Francisco, July 12, 1900.

To the President of the University,

Sir:—The affairs of the San Francisco Polyclinic, the Postgraduate Medical Department of the University of California, I am pleased to say are constantly progressing. Our Postgraduate school is becoming better known, and inquiries, not only from all over the coast, but from many other States in the Union, are constantly being made. As our postgraduates leave us they send others to take their places. We are now giving regular courses of four weeks' duration, and as a general thing the students apply for a second course, which gives them sufficient time to shake off some of the rust which has been accumulating for years.

Our field of teaching has also been enlarged this year. A large 700C Edison X-Ray apparatus has also been installed, and we expect that original researches will be incited in that direction. It has also been decided to add another story to the Polyclinic building for the purpose of giving courses in Operative Surgery on the Cadaver, and also to increase the facilities for Pathological and Microscopical work. An appropriation has also been made lately to equip the Postgraduate Department with all necessary facilities for teaching purposes and all modern instruments for operating purposes, so that the student will learn to know what progress is being made in the different branches of medicine.

Another new institution is the issuing of a quarterly bulletin, in which accounts of cases of interest to the medical world will be published. It will be edited by the Faculty of the Postgraduate Department. Considering that the Postgraduate school stands on its own resources and that all expenditures are made by the San Francisco Polyclinic, we flatter ourselves to say that we are doing our share of the work, and that it is the aim of the Postgraduate Department to make itself a much-sought-after institution.

Respectfully submitted,

Martin Regensburger,

Secretary Board of Trustees of the San Francisco Polyclinic.

DENTAL DEPARTMENT.

San Francisco, July 5, 1900.

To the President of the University,

Sir:—Since the last biennial report several changes have taken place in the Dental Department.

At the end of the session of 1898–99, by the resignation of Professor Dunbar, we lost our Dean, who has served for the past ten years, and under whose administration the College has improved greatly in every respect—in number of students, number of teachers, size of quarters, requirements for admission, course of study, and requirements for graduation.

During the past two years the number of students has been nearly the same as during the previous two years, though slightly less during the session of 1899–1900, on account of the existence of five other dental colleges on the Coast, with requirements below those maintained by this Department. The number of students in attendance in the session of 1898–99 was 161; in 1899–1900, 147. The number of graduates in 1899 was forty-six, and in 1900 forty-five.

With great regret, we chronicle the loss during the war in the Philippines of one student and four graduates. One was killed in battle while serving in the Hospital Corps, while the death of the others was due to sickness acquired in similar service.

During the last two years three of our graduates have been appointed on our Faculty by the Board of Regents, viz.: W. F. Sharp, D.D.S., Professor of Prosthetic Dentistry; Harry P. Carlton, D.D.S., Professor of Operative Dentistry, and J. D. Hodgen, D.D.S., Professor of Chemistry and Metallurgy, the last two taking the places of Professor L. L. Dunbar and A. L. Lengfeld, resigned. These resignations were greatly regretted by the Faculty, as the latter had served for the full eighteen years since the College was started, and the other nearly as long; but it is a matter of pride that graduates of our own have been found competent to take their places.

For about nine years the Department has occupied rented quarters, but would have moved into the new building provided by the State more than a year ago except for lack of funds for furnishing.

As the State Legislature had been so liberal in erecting a new building, the Faculty were in hope of securing from the same source an appropriation for the necessary furnishing and equipment. Having failed in this, they decided not to wait longer,—the building having been vacant more than a year,—but secured a loan for which they individually pledged themselves. They have begun to supply the equipment as far as this loan will go. It is hoped that the State will provide for the payment of this loan, and at the same time supply additional equipment.

The next session, beginning September 3, 1900, will be held in the new building. On account of the spare population in the new location, the Dental Infirmary will be continued in the old location, on the corner of Market and Taylor streets, where there has always been an abundant supply of patients for the students' clinics. This is an exceedingly important part of our instruction, as at least half of the time of the senior and junior students is spent in actual practice on patients, for whom all kinds of dental services are rendered at actual cost.

The schedule of lectures and infirmary attendance has been carefully arranged, so as to cause a minimum loss of time in passing back and forth between the old and new departments, which are, unfortunately, some distance apart.

I hope that the Dental Department will be able to present a report showing much greater progress during the next two years.

Respectfully submitted,
C. L. GODDARD,
Dean of the Dental Department.

CALIFORNIA COLLEGE OF PHARMACY.

(DEPARTMENT OF PHARMACY, UNIVERSITY OF CALIFORNIA.)

SAN FRANCISCO, July 17, 1900.

To the President of the University,

SIR:—I have the honor to submit the following report of the condition, progress, and needs of the College of Pharmacy.

When the last biennial report was presented, the Faculty and Directors were planning to move into the new buildings that had been erected on Parnassus avenue for their use in common with the other professional colleges. It was necessary to raise $2,000 to pay the expense of moving and of getting the new building into order for our use. This money, after much effort, was nearly all obtained by subscription from the alumni and other friends of pharmaceutical education, so that by the first week in January the doors were thrown open and the work of teaching entered upon. No money was expended for comfort or adornment. Even the ladies' cloak room depended upon the kindness of a friend for a carpet and a few other comforts. The building being very much larger than the old one, and intended for a greater number of students, the old equipment was found to be scarcely adequate, and some small additions were made. Several thousand dollars' additional equipment is greatly needed. But the surroundings are so healthful and the *esprit du corps* of the students such that teaching under these conditions is a pleasure to the Faculty and a boon to the students.

The session of 1899 and 1900 opened with a rather larger class than we have had for some years. It is pleasing to note that the number of high school graduates is steadily increasing, so that at the last term the percentage of these was forty-four, which is the highest in the history of the College. This improvement has been brought about by persistent effort to educate pharmacists on this point through the pharmaceutical journals and by every other means that could advantageously be used. We hope the time is not very far distant when we may be able to make graduation from a high school, or its equivalent, a condition of matriculation, but this cannot be done at present, particularly in view of the keen competition from Eastern schools of long standing and good repute, as well as of others on this coast, which all accept a grammar school certificate. That the attendance last year should have been as good as it was in the face of these conditions is an unmistakable evidence that the honest work here being done is appreciated.

We hoped to have announced positively that a third year or post-graduate course would be commenced at the opening of the ensuing session. The necessity for this is peculiarly felt by our Faculty, but but we are unable to give this course of instruction without additional equipment in the form of chemical apparatus, microscopes and microscopical appliances and books of reference. Even at this late day we are not without hope that the money may be forthcoming through the generosity of some of our public-spirited citizens; but if we are disappointed in this expectation we shall look forward to the fulfillment of our hopes in the year 1901.

We also hope that a closer union between ourselves and the University will shortly be accomplished. Our inability to sell the old Fulton street property, which would enable us to extinguish some indebtedness, is all, apparently, that stands in the way of a more complete union. This matter, we trust, will also be accomplished during the present year.

On the whole the outlook is encouraging, more particularly because there is a manifest willingness on the part of young men to secure a better preliminary education before coming to us, while other colleges of pharmacy are offering inducements to students to come with lower entrance requirements, and are granting diplomas upon a smaller amount of instruction and less stringent examinations.

Respectfully submitted,
W. M. Searby,
Dean of the College of Pharmacy.

VETERINARY DEPARTMENT.

San Francisco, Cal., December 14, 1900.

To the President of the University,

Sir:—The session of 1899–1900 was a very uneventful one for this Department. We continued the use of the building at Post and Fillmore streets, not only because we still held a lease on the place, but for the reason that we could not take up our quarters in the new building without having sufficient funds to equip it. There were only two students for the session. These were in the sophomore year, and received their lectures regularly in all departments.

It is with considerable regret that I have to report to you the desire of the different members of the faculty to close this Department. The cause is lack of funds to enable us to enter our new building, and not only furnish it properly, but to advertise it thoroughly, both by catalogue and other means. For two years now we have been unable to issue a catalogue. This in itself is a very serious drawback to the development of this Department. The different members of the faculty, having been called upon for money every year since the college began, are now unwilling to give any further aid. It is very discouraging, after having given both time and money for five years, to contemplate now the closing of this Department. We know the importance of Veterinary Science, and we are very proud of our profession, but it seems impossible to receive encouragement from any outsiders. Without some endowment to furnish thoroughly the new building, and to allow of our advertising the college as it should be done, we shall be forced to resign. At present we have no quarters to lecture in, and we have no students on the roll.

Respectfully submitted,
K. O. Steers,
Secretary of the Faculty.

LIBRARY.

BERKELEY, August 19, 1900.

To the President of the University,

SIR:—In the absence of Librarian J. C. Rowell, permit me to present the following notes concerning the Library during the two years ending June 30, 1900.

The Library now has 80,224 catalogued books. Of these, 3,988 volumes were received by purchase and 4,258 by gift in the last two years, in addition to the gift of 7,485 pamphlets, and the receipt of over 200 periodicals which reach the Library regularly as exchanges. The principal donors were: Mrs. J. C. Ainsworth of Oakland, Mrs. Frances Grayson-Crane of St. Helena, Regent E. A. Denicke, Regent Mrs. Phœbe A. Hearst, Mr. G. N. Mastick of Alameda, Mr. J. K. Moffitt of San Francisco, and the estate of Professor G. M. Richardson.

The average hourly attendance of readers in the Library was 134.9 in the day time and 37 in the evening. The use of the Library is still limited by the available floor space. The art gallery has been converted into a regular reading room by the addition of tables and chairs. The basement has been used for the stacking of books that can no longer find a place in the rotunda.

A large part of the Semitic library gathered in 1897 by the efforts of Rev. Dr. Voorsanger, the California manuscripts and pamphlets donated by Mr. C. P. Huntington in 1897, and dissertations of foreign universities bound more than a year ago, are still uncatalogued. The binding of purchased periodicals has been fairly completely done to the close of 1899, but over $500 worth of this work is payable from the appropriation of 1900–01. Other binding of government publications, society transactions, university catalogues, theses, and miscellaneous pamphlets and periodicals received as gifts, is far in arrears.

The system of inter-library loans has been a decided advantage to us. However, the lack of printed catalogues of college libraries leaves the borrower at a loss to know where to apply for a desired book. At least an author list of our books should be published.

The loss of books continues. In two years 388 have disappeared and 88 reappeared, leaving a net loss of 300. This is almost as great as the total previous net loss of 342 reported on October 5, 1898. The greatest harm which results from these losses is not the cost of replacing them. It is the great inconvenience and loss of time of the many readers who do not know whether these books are lost, misplaced, or loaned out.

Last winter the Board of Regents granted Librarian Rowell an eight-months' leave of absence, ending December 31, 1900. On May 1st he left Berkeley, and he will spend his vacation in visiting the libraries of the United States and Europe. He will collect personal information to help shape and equip the new Library building of this University. Since January 1, 1900, Reference Librarian C. K. Jones has been absent from Berkeley on a six-months' leave of absence granted on account of continued poor health. In our Library, with our limited number of assistants, with our open shelf system, with the unchecked selfishness of certain borrowers, and with no elevators, the Librarian and assistants run great risks of mental and physical collapse. In June Mr. Jones handed in his resignation to accept a position in the Congressional Library in Washington. We note with great pleasure the provision for a cataloguer from the funds of 1900–01.

To meet the wants of the large number of students in attendance at the Summer School of 1900, the Library was opened all day for five days in the week. From this it is only an easy step to closing the Library only on legal holidays.

I venture to suggest a few changes. The Library rules might be changed to allow greater privileges to the student as he advances. Let one book at a time be loaned to a freshman, two books to a sophomore, three to a junior, four to a senior, and five to a graduate student. The privilege to draw books, which is granted to alumni and summer readers upon a deposit of five dollars, should be extended to a limited number of other persons recommended by the Librarian or Recorder and approved by the President.

Since we are compelled to use the basement as a storeroom and workroom, and since it is in part below the surface of the adjacent ground, to assist in keeping it as dry as possible, I recommend the omission of all irrigation between the Library and the walk east of it. To facilitate certain general repairs, retinting, carpet relaying, renovation of furniture, etc., which cannot readily be done in the Library rooms during term-time, the appropriations for such purposes should be available, if possible, as soon as College closes in May of each year. The walls and, in some parts, the ceilings of the Library should be carefully calcimined. The main floor and galleries should be relaid with linoleum, or at least painted where bare.

In the annual apportionment of the Reese Fund and other Library money for the purchase of books, the share set apart for the Librarian should equal or exceed that for the head of any other department.

Let access to the book-stack be limited as soon as added Library funds will permit the payment of additional expenses for assistants.

Let us increase our periodical list, which now costs $1,440 per year, by twenty-five per cent.

Permit me to insert two quotations from Librarian Rowell's last annual report, printed a year ago:

"In September, 1898, an Advisory Committee on Library was chosen from the Graduate Council, consisting of Professors Bacon, Merrill and Slate, and two conferences with the Librarian have been held for the discussion of free access to shelves and the annual allotment of money for book purchases."

"I have mentioned above the inadequacy of the present Library structure in respect of seating capacity for readers. The exigency of additional space for the storage of books is also to be urged upon your considerate attention. At our present rate of increase, space for the proper and orderly arrangement of books will be entirely taken up within four years! It is evident that amongst the most imperative needs of the University, if itself be not *the* most imperative, is a new storehouse for our literary treasures. The adoption of the new Phoebe A. Hearst Architectural Plan should be the instant signal for the immediate planning and erection of the new Library."

Respectfully submitted,

J. D. LAYMAN,
Assistant Librarian.

PROCEEDINGS OF UNIVERSITY SOCIETIES.

(The names of the officers reporting are appended to the following brief abstracts of their reports.)

ART ASSOCIATION.

The Art Association of the University of California was organized in April, 1899, with a charter membership of seventy-five women students and an associate membership of fifteen. The enrollment in April, 1900, was 250 women-students and 85 associate members.

April 18 and 19, 1899, an exhibit of Keith's paintings, with many fine etchings and photographs, was held in Stiles Hall. There were accompanying lectures, and a reception. September 20 there was a concert by professionals in Stiles Hall. November 1 there was a reading from Shakespeare by Howard Malcolm Ticknor, M.A., and Mrs. Frances Edgerton. February 8, 1900, there was a concert by students in Hearst Hall. March 15 there was a lecture in Hearst Hall by President Wheeler on "Greek Religion in Greek Art." Several receptions were given to the members of the Art Association during the year.

It is hoped that the associate membership will increase so that the association may add recreation not otherwise provided for to the student life, and that the entertainments will supplement and add to the culture courses of the college. The average attendance has been over 600.

Mary Bell,
President.

ASSOCIATED ALUMNI.

A number of undertakings, primarily social, have been carried out by the Council of the Associated Alumni during the past two years. Of these the first to be mentioned is the general alumni rally and luncheon on Commencement Day, at Berkeley, henceforth one of the fixed events of the Commencement season. For last Commencement Day Mrs. Hearst graciously requested the pleasure of entertaining the alumni at Hearst Hall, and the luncheon was given in this way, the council being responsible only for making the arrangements.

On Charter Day, March 23, 1900, a reception by all the alumni of the University was given to President and Mrs. Wheeler at the Mark Hopkins Institute of Art in San Francisco, under the management of the council. The fact that these events have been planned and carried out by the whole alumni body, working with equal voice and influence regardless of the department of the University from which they may be graduated, has unquestionably given them considerable importance as influences toward the long-hoped-for unification and consolidation of University forces.

Efforts in a number of directions more material to the welfare of the University have been made by the council. Of these mention may be first made of those aiming to make of the alumni body as a whole a more active and efficient working force for the University. Plans have been considered for preparing the first general directory of the alumni. Beyond a consideration of what the character of such a register should be, and the formulation of a plan of procedure in its preparation, nothing has been done, owing to the lack of funds. The urgent need for such a work makes it greatly to be hoped that means requisite for accomplishing it may be found in the near future.

A more direct and important effort to mobilize the alumni for service to the University is that now in progress to organize them throughout the State into local clubs. This movement was set definitely on foot by the alumni conference held at Berkeley on Charter Day last, called by the council. Already several such clubs have been formed, and others will soon be completed. In response to requests from various directions a committee of the council has printed and circulated among the alumni a letter of suggestions relative to the scope and character of the proposed organizations.

Of like import with these movements, but advancing the idea a step farther, has been the formulation of a plan for the nomination by the alumni of candidates for the University regency.

Acting on a recommendation made by the President of the Council, in his annual report of 1899, a committee has had this subject under consideration during the past year, and its completed report is now in the hands of the council awaiting further action.

Wishing to do something for the encouragement of original investigation in the University, the council has established to this end some money prizes of one hundred dollars each; these to be transferred from time to time, as the council may deem wise, to different departments of knowledge. The departments designated for the years 1900 and 1901 are, respectively, Medicine and Social Science. The conditions to which the competitions are subject are set forth in writing, and are furnished on application to persons interested.

It may be assumed, in conclusion, that the experiences of the council, brief as its life has been, warrant some reflections concerning its future.

The University will have to depend upon its alumni for the greatness in coming years to which we all look confidently forward, more than it has for its earlier growth. More and more will it have to look to them for its funds; for the extension of its influence in the commonwealth; and for its rank in the world of learning. A corollary to this will be the drawing of the alumni into closer and closer contact with the University. Their voice will be heard more and more in its counsels; they will more and more influence its policy; their votes will by and by help to choose its governing board.

Some sort of a mechanism there will have to be for them to act through. What shall it be? A small, compact, representative body, with adequate powers, with locus near the University, and with an executive officer, or a small executive committee in very close touch with its official life, must be the essential characteristics of the required machinery.

In most of these particulars the Council of the Associated Alumni meets the requirements. Two weaknesses in it would, however, have to be removed before it could do so fully. Its powers are inadequate, particularly for raising funds with which to carry on its regular work, and the methods by which its members are chosen are defective.

This is not the place to discuss at length these points, but one or two suggestions regarding them may be made. At present the income of the council is from a fee of five dollars per annum for each councilor, paid irregularly from the treasury of the departmental associations which the councilors represent. The efforts of the organization are much hampered by the chronicly depleted state of its treasury. There are now nearly four thousand graduates of the University. All efforts hitherto made, both by the academic and by the professional alumni associations to collect fees have resulted unsatisfactorily so far as the number of responses is concerned. A large majority of the graduates (I believe this majority is larger among the academic than among the professional alumni bodies), never pay any dues at all to the alumni associations. I am confident that this does not signify disloyalty or indifference to the University among the alumni, but that the reason why little interest is taken in alumni affairs by so many of the alumni is that the alumni organizations are cut off from—remote from—the University itself. Couple with active membership in alumni organizations some direct, palpable obligations to the University, and membership will be sought and gladly paid for; and all the more would this be so could not only some obligation to the University, but also some direct privilege or benefit from it be also coupled with the membership. Loyalty to the University is genuine and wellnigh universal among the alumni, and would, I believe, be active instead of passive could the prevailing belief be destroyed that there is no particular need for them to exercise themselves in its behalf.

The defect of the method of choosing representatives to the council is that the membership is not representative of the alumni of the State as a whole. Virtually the several alumni associations which elect the councilors are restricted in their membership to the bay communities; and it naturally results from this that the council represents, in reality, only this portion of the State.

A partial remedy, at least, for this would be to transfer the election of councilors from the departmental alumni associations to the local clubs that are expected to be formed. But this remedy would not be complete since the representatives themselves would probably still have to be selected from this locality. It would be wellnigh impossible for persons residing in remote parts of the State to attend meetings as frequently as they ought to be held. I am inclined to believe, however, that the change here suggested would, after a time, be wise.

William E. Ritter,
President of the Council.

ASSOCIATED STUDENTS.

Before July, 1898, the activities of the Associated Students had been hampered by the separate existence of the Athletic Association. The Associated Students had exercised control over debating interests, and had taken action on rushing and other questions relating to the whole student body. The association had been dependent for its meager income upon periodic assessments only partially collected, and that with difficulty.

During 1898–99 the officers were: President, C. E. Thomas, '99; Vice-President, Robert H. Collins, '00; Secretary, William Mooney, '99; Treasurer, Ralph C. Daniels, '99. During the fall term the systematic control of rallies was assumed. The first attempt to rescue the organization from decrepitude was made when the executive committee submitted to the students a petition for signature requesting the Board of Regents to levy an annual fee of 25 cents, for the benefit of the Associated Students, as a condition for registration. The measure was defeated by opposition in the student body, but it accomplished its purpose in thoroughly awakening the student mind. The way was thus paved for the new constitution, which abolished the Athletic Association as a separate body, and gave the control of all student interests to the Associated Students. The former functions were entrusted to an executive committee, with broad powers, while athletic affairs were entrusted to a separate athletic committee. These committees had practically full power to act in their separate spheres. The new constitution went into effect in May, 1899.

The officers for the year 1899–1900 were: President, Fred G. Dorety, '00; Vice-President, Clinton E. Miller, '00; Secretary, Richard W. Tully, '01; Treasurer, Lawrence Kaarsberg, '99.

The year began with a deficit of about $2,000. Owing to the payment of an unprecedented salary for Eastern coaches, and unusually large training-house expenses, together with the northern trip of the Glee Club, this deficit was increased to about $3,500. Control of the financial affairs of the Musical Association, together with its debt of about $700, was assumed by the Associated Students, and this burden was increased by about $1,200 by the Glee Club's northern trip at Christmas. A considerable part of this debt was paid, however, by the exertions of the clubs during the spring term.

The students tendered a reception to President and Mrs. Wheeler in the Mark Hopkins Institute of Art on their arrival in California. A lecture on the "Olympian Games" was given by President Wheeler for the benefit of the Association. The usual Thanksgiving night entertainment was held in the Grand Opera House, for the first time under the auspices of the Associated Students.

During the spring term monthly rallies were held in Hearst Hall. A military ball was given in the same hall, and a "Dedication Dance" held in the new gymnasium a few weeks later. Class Day the statue of "The Football Player," by Douglas Tilden, presented to the University by Mayor James D. Phelan, as a trophy in football, was formally unveiled.

The control of all student activities through student managers responsible to the central body proved inadvisable on account of the rapidly increasing magnitude of business. A committee was appointed to revise the constitution so as to provide for a salaried graduate manager. A new constitution providing for a more business-like administration of affairs, by a graduate manager elected for two years, was adopted at the end of the term, and Reno Hutchinson, '00, elected. The other officers elected for 1900–01 were: Ralph T. Fisher, President; William P. Drum, Vice-President; J. M. Eshleman, Secretary.

Fred G. Dorety,
President (1899–1900).

ASSOCIATED WOMEN STUDENTS.

The adoption of a new constitution by the Associated Students necessitated a change in the constitution of the Associated Women Students, in accordance with which the executive power of the Association is vested in a standing committee of the A. S. U. C.—the Committee on Women Student Affairs—composed of nine members, including the President, the First Vice-President, and the Secretary of the Associated Women Students, and the chairmen of the various other committees.

The Ladies' Room Committee has had charge of the rooms in North Hall, and of the quarters in East Hall which Mrs. Phœbe Hearst so generously furnished with everything needed for convenience and comfort. Mrs. Hearst's plans have included the distribution of writing-paper, pens, ink, etc., as well as of tea and sugar for the midday lunches.

The Social Committee arranged a football social at the beginning of the year, and a luncheon in honor of Mrs. Hearst. The Finance Committee collected dues from about 250 women, last year's membership of the Association. Special committees arranged for a birthday gift to Professor LeConte, and for a testimonial to Mrs. Hearst.

For the success of the Association during the past year, for the interest she has taken in our welfare, for the pleasure she has repeatedly given us, and for her unfailing sympathy with us at all times, we wish to make sincere and grateful acknowledgment to Mrs. Hearst. None but college girls can fully realize how much all this has meant.

Our policy for the year past has been to strengthen the connection formed between the A. S. U. C. and the A. W. S., to coöperate under the new constitution, rather than to undertake any radical separate moves.

Gertrude Maxwell Jewett,
President (1899–1900).

BERKELEY SKETCH CLUB.

At a meeting of the women students of the Department of Decorative Art of the University, February 29, 1900, the Berkeley Sketch Club was organized for the promotion of a higher artistic standard among the members, and for figure drawing. At this meeting officers were elected as follows: President, Leslie Grinnell; Secretary and Treasurer, Agnes Knerr. A studio was secured through the kindness of the Misses King, and the club has held regular weekly meetings during the term. The models were hired on the recommendation of the Mark Hopkins Institute of Art and the San Francisco Sketch Club. In March Miss Victoria Stewart was elected secretary, and in April Mrs. Ella Fassett was elected business manager. The membership has been necessarily small, owing to limited studio accommodations.

Leslie Grinnell,
President.

CALIFORNIA UNION.

The object of the organizers of the California Union was to advance the interests of the University by obtaining and disseminating information on its needs, by discussion, and by coöperation with the Alumni Association and other organizations interested in the University. It was the purpose of the founders of the union that its discussions should be among its own members. Members of the Faculty were asked to give papers upon subjects connected with the University for the benefit of the members of the union, the papers to be followed by a general discussion. The public soon evinced such interest in the meetings that it was decided to throw them open. The response to this invitation, though gratifying, threatened to defeat the objects of the union, for the attendance grew so large that the discussion became limited. "Members' meetings" were therefore inaugurated, at which only members and specially invited guests were present; the guests usually including the author of the paper of the previous public meeting and others specially conversant with the subject.

For the college year 1898–99 the officers were: President, George D. Louderback; Secretary and Treasurer, Arthur W. Gray; Executive Committee, H. B. Torrey, James Sutton, C. A. Noble.

The papers given were as follows:

October 11, 1898, Dr. W. P. Boynton—Clark University.

November 10, Professor Frederick Slate—The Relation between Universities and Secondary Schools. (Discussion by Professors LeConte, Senger, Lawson, Hilgard, Ritter, Christy, Stringham and Mr. Cottrell.)

December 6, Professor W. A. Merrill—The Significance of the Bachelor's Degree in American Universities.

December 15 (members' meeting), Dr. L. M. Solomons—The Presidential Question.

February 14, 1899, Professor W. E. Ritter—The Standards of Scholarship in the Greater University.

March 21, Professor Elmer E. Brown—Academic Freedom.

April 18, Professor Isaac Flagg—Moral Aspects of Prescription.

For the year 1899–1900 the officers were: President, F. G. Cottrell; Secretary and Treasurer, C. P. Nott; Executive Committee, George D. Louderback, James Sutton, K. C. Babcock.

The principal business of the year was the consideration of the proposition to consolidate the California Union and the Graduate Club. After much discussion it was finally concluded that the constituent elements and the aims of the two bodies were too diverse to make complete fusion expedient. It was decided, however, that in general that part of the activities of the union which had been comprised in the public meetings could be more advantageously carried on in coöperation with the Graduate Club; and several successful joint meetings were held in accordance with this plan. This plan tended to limit still further the work belonging especially to the union, and in order to define clearly its position with respect to the Graduate Club and the graduate student body in general it was "*Resolved*, That the membership of the California Union shall, as far as possible, consist of persons who are actively engaged in, or are preparing for, professional work in higher education"; and that the special activities of the union should be directed along these lines.

The addresses of the year were:

October 10, 1899, Professor C. C. Plehn—Possibilities of Graduate Work in the College of Commerce.

November 3 (joint meeting of union and Graduate Club), Professor Clyde A. Duniway—The Federation of Graduate Clubs.

November 16 (members' meeting), Dr. E. C. Moore—The Place of Education in Reform. (Discussion by Professor Brown and members.)

February 9, 1900 (joint meeting of union and Graduate Club), Professor A. O. Leuschner—Uniform Requirements for the Higher Degrees. The Stanford Graduate Club was present as the guest of the two societies, and was entertained at dinner at the Dining Association after the meeting.

February 27 (members' meeting), Messrs. P. G. Nutting, R. C. Root, C. A. Noble, C. P. Nott—The Position Universities should Take in Regard to Investigation.

May 3 (members' meeting), Professor Alfred Emerson—An Ascent of Mount Olympus and other Excursions from the American School of Classical Studies at Athens.

May 11 (joint meeting of the Graduate Club and the California Union in Hearst Hall), President David Starr Jordan—The Freedom of the University.

May 15, annual banquet.

The following papers, given before the California Union during the years 1898–99 and 1899–1900, have been published:

Frederick Slate—The Relation of the University to the Secondary Schools. *University Chronicle*, Vol. I, No. 6.

L. M. Solomons—The Presidential Question. *University of California Magazine*, Vol. V, No. 1.

Isaac Flagg—Anthology of University Reform. *University Chronicle*, Vol. II, No. 3.

Carl C. Plehn—Higher Commercial Education and Graduate Studies. *University Chronicle*, Vol. II, No. 5.

David Starr Jordan—A Consideration of Herbert Spencer's Essay on Education. *The Cosmopolitan*, July, 1900.

FRANK W. BANCROFT,
President.

CHORAL SOCIETY.

The object of the Choral Society is to give an opportunity to the women students of the University to study musical works written for women's voices. Any woman connected with the University who possesses a good voice and an ability to read music is eligible to membership. The size of the organization is limited only by the necessity of keeping the parts balanced. The meetings are held every Thursday evening at 7:45, in the Ladies' Room in East Hall. The dues are twenty-five cents a month. Mr. David W. Loring is now acting for the second year as the musical director and Professor Senger as the Faculty adviser. The present membership is forty-eight, with an average attendance of thirty-nine. There are six additional members on leave.

ALICE B. WYTHE,
President.

FIELD CLUB.

The University of California Field Club was organized January 20, 1900, for the purpose of promoting tramping trips into the Oakland hills and the Mt. Diablo region by the undergraduates, and thereby stimulating in the student body an interest in nature and out-of-doors. The club proposes to accumulate knowledge concerning the topography, geology, animals, and plants of the region. While it is not intended that the tramps or expeditions shall be primarily scientific, it is proposed to develop such an interest in the country as would be enjoyed by the well-informed or observant traveler. The club made five long excursions between January and May, 1900, and some short ones. The officers are: Dr. W. L. Jepson, President; Mr. Harold Bradley, Secretary. These, with Mr. J. B. Davy, form the executive committee of the club.

W. L. JEPSON,
President.

GRADUATE CLUB.

At the meeting of October 12, 1898, officers for the year 1898–99 were elected as follows: President, Mr. Husband; Vice-President, Miss Raymond; Secretary-Treasurer, Miss Martin; Assistant Secretary-Treasurer, Mr. Bissell. Entrance fees were abolished and the annual dues fixed at $1. The members of the club were given a reception by the officers in Stiles Hall on November 4th, and for the rest of the year social meetings were held at the homes of some of the members.

On October 13, 1899, officers were elected for the year 1899–1900 as follows: President, Harry B. Torrey; Vice-President, Miss Reed; Secretary-Treasurer, Miss Walker; Assistant Secretary-Treasurer, Mr. Nutting. During the year a list of books most urgently needed by the several departments of the University was compiled by the club with the assistance of the heads and leading members of each department. This list was printed, and an endeavor will be made to have it reach all alumni and other friends of the University who may wish to assist in the growth of the Library. Mr. Torrey resigned the presidency of the club in December, and was succeeded by Mr. R. C. Root in February. Four public meetings were held during the year. October 20 President Wheeler spoke on "Graduate Clubs in Other Colleges," and Professor Leuschner on "The Equalization of Doctor's Degrees." March 2 Professor LeConte told of Student Life at Berkeley in the early days, and a symposium on college life at the principal universities in this country and Germany was given by members of the club. April 13 Professor W. D. Armes gave some readings from Stephen Phillips, and on May 11, at a meeting in Hearst Hall, President David Starr Jordan of Stanford lectured on "The Freedom of the University."

The following officers for the year 1900–01 were elected on October 18, 1900: President, Mr. Plumb; Vice-President, Miss Raymond; Secretary-Treasurer, Mr. Ellis; Assistant Secretary-Treasurer, Miss Congdon. November 7 Mr. Louis Dyer of Oxford gave a talk on "Student Life and Study at Oxford."

Max Alaric Plumb,
President.

GREEK CLUB.

The Greek Club is an organization of teachers and advanced students of Greek, for the purpose of mutual criticism and discussion. It was founded in 1897, and meets every Saturday evening during the academic year at the residence of Professor Clapp. At each meeting one of the members presents a translation of a passage from the author selected for the year's study, after which the other members in turn offer their criticisms. The membership is limited to ten. During the academic year 1898–99 eight biographies of Plutarch were read and discussed; and in 1899–1900, the first four books of Thucydides. The membership of the club for 1899–1900 consisted of four university instructors, two high school instructors, and four graduate students.

Edward B. Clapp.

HOMER CLUB.

The Homer Club, organized in the fall of 1898, is a voluntary organization of undergraduates, excluding Freshmen, limited to ten in number, for the purpose of sight translation in Homer. The Club meets for one hour in one of the University buildings (North Hall) every Tuesday evening. The meetings are entirely informal and no University credit is given for the work. Portions of the Odyssey are read in successive years; in 1898–99 nine books were read (Bks. xiii-xxi), the readings averaging 175 lines in length; in 1899-1900 the Club read eight and one-half books (Bks. v-xiii), maintaining an average of about 190 lines an evening.

James T. Allen.

NEWMAN CLUB.

The Newman Club, comprised of Catholic instructors and students of the University of California, came into existence in December, 1899, with an initial membership of fifty. Its objects were to bring its members into closer relationship with one another, thus enabling them, by a more intimate intellectual intercourse, to remain true to their faith, and to afford them an opportunity of supplementing their University work with a thorough and systematic study of Catholic literature. Furthermore, the objects are propagandistic only to the extent that the club may offset antagonism on the part of the Catholic citizens of California to legislative enactments concerning the University, that it may break down Catholic spirit adverse to the University, and that it may bring Catholic into closer relation with it.

The manner of study is as follows: A work is undertaken. The president announces the amount to be read by the body as a whole. He assigns, also, to not more than three members, critical papers, the immediate topics of which are selected by those members. After the presentation of the papers there is discussion by the entire body. During the past year Cardinal Newman's "Idea of a University" and Bishop Spaulding's "Education and Higher Life" have been read. It is contemplated that the more important essays shall be published in book-form.

The constitution has been amended since its adoption so as to extend honorary membership to any one interested in the work. Active membership is of Catholics.

Lawrence S. O'Toole,
President.

PHI BETA KAPPA.

The Alpha Chapter of the Phi Beta Kappa in the State of California was organized under the authority of the United Chapters of the Phi Beta Kappa Society December 14, 1898. The petitioners and charter members were all Phi Beta Kappa members of the academic faculty of the University: Professors Kellogg, Howison, Rising, Flagg, Stringham, Setchell, Haskell, Rockwell, Lewis, Plehn, and Babcock, and Dr. Nutting. Upon organization it was decided that election of undergraduates "shall ordinarily be from candidates for the B.A. and B.L. degrees, though candidates for the B.S. degree shall not be deemed ineligible. But no person shall be considered eligible who has not shown evidence of broad general culture." The number elected each year "shall not exceed one-tenth of all the Seniors who are then candidates for the B.A. and B.L. degrees." Provision is also made for graduate, alumni, and honorary elections to membership. Under these regulations the chapter elected from the class of '99 eleven persons, three women and eight men; from the class of '00, eleven persons, two women and nine men. Honorary elections brought into the society Professor Charles Mills Gayley, Professor Joseph LeConte, and Rev. Robert J. Burdette. The first annual public meeting was held on Tuesday of Commencement week, 1899. The address was given by Professor Howison, Professor Gayley reading a poem. The second public meeting, held at Commencement time in 1900, was addressed by Rev. Robert J. Burdette.

The present officers of the chapter are: President, Professor G. H. Howison; Vice-Presidents, Professors M. W. Haskell, W. A. Setchell, and C. M. Gayley; Secretary and Treasurer, Professor K. C. Babcock.

KENDRIC CHARLES BABCOCK,
Secretary.

PHILOMATHEAN COUNCIL.

The desire of the women students of the University of California for practice in argumentation found expression in November, 1898, when Miss Clotilde Grunsky, President of the Associated Women Students, brought the matter before that body. The first officers were Miss Agnes Frisius, '01, President, and Miss Josephine Dow, '02, Secretary. At the first regular meeting of the Council, in December, 1898, Professor Gayley delivered an address on "Methods of Argumentation." Four debates were held during the semester.

In September, 1899, the following new officers were elected: President, Miss Margaret French, '02; Secretary, Miss Annie Allen, '01; Topic Committee—Misses Bessie French, '00, Agnes Frisius, '01, and Edith Brownsill, '99.

The Council has from time to time received assistance from members of the Faculty—notably Professor Gayley and Mr. Flaherty, and Professor Jones—as well as courteous recognition by the Students' Congress, and material aid from the University printer and other officers.

MARGARET E. FRENCH.

PHILOSOPHICAL UNION.

The Philosophical Union of the University of California devoted its meetings during the year 1898–99 to a study of ethics, using Professor John Dewey's Syllabus of Ethics as the basis of its work. At each of the monthly meetings held during the year the discussion of some phase of the subject was undertaken by a leader and reviewed by critics appointed for the purpose, after which it was thrown open to the audience. At the end of the year Professor Dewey came to Berkeley from the University of Chicago as the the guest of the Union and delivered three lectures, two of which were given in the lecture-room of the Philosophy Building, and the third—the annual address—in the Harmon Gymnasium, before an audience of about a thousand people. This lecture upon Psychology and Philosophical Method was published by the Union in pamphlet form and distributed to its members. During the year the active membership of the Union was about one hundred and thirty-five and the average attendance at its meetings about sixty-five.

An innovation was introduced in the programme of the Union for the year 1899–1900. Instead of devoting its monthly meetings to an informal study of a system of philosophy and inviting its author or leading representative to close the work of the year by journeying to California and defending his position before the members and friends of the Union. as had been its habit heretofore, the Union invited Professor G. M. Stratton to give a series of ten lectures on the Import of Psychological Experiments. Thus under his leadership the year was devoted to a study of Modern Psychology. Much interest was evidenced in this course. The monthly audiences were uniformly large and the discussions which followed the lecture were spirited. It is hoped that these lectures will shortly appear in book form in the Union's series of contributions to philosophical knowledge. At its annual meeting the following officers were elected for the ensuing year: President, George H. Howison; Secretary, E. C. Moore; Treasurer, James K. Moffitt; Councilors, F. C. Torrey and James Sutton.

E. C. Moore,
Secretary.

SCIENCE ASSOCIATION.

The last two years have been very successful for the Science Association of the University. A large number of well-attended general meetings have been held. A considerable part of the work of the association is done in the meetings of the five sections, Mathematics, Physics, and Astronomy; Chemistry, Geology, Botany, and Zoölogy. The chairmen of the sections are the vice-presidents of the association, their order being determined by lot.

Most of the addresses delivered at the general meetings have been printed in the *University Chronicle*, while many of the papers read at the section meetings have been published in various scientific journals. A great many of these papers embody original investigations of value. Appended is a list of officers and of the general meetings held in the course of the last two years.

E. J. Wilczynski,
Secretary-Treasurer.

Officers, 1898–99: Professor M. W. Haskell, President; Dr. W. J. V. Osterhout, Secretary-Treasurer; Vice-Presidents: Mr. G. D. Louderback, Chairman Geology and Mineralogy Section; Professor W. B. Rising, Chairman Chemistry Section; Professor W. A. Setchell, Chairman Botany Section; Professor Irving Stringham, Chairman Mathematics, Physics, and Astronomy Section; Mr. H. B. Torrey, Chairman Zoölogy Section.

1899–1900: Professor A. O. Leuschner, President; Mr. H. B. Torrey, Secretary-Treasurer, first term; Dr. E. J. Wilczynski, Secretary-Treasurer, second term; Vice-Presidents: Professor H. P. Johnson, Chairman Zoölogy Section; Professor W. A. Setchell, Chairman Botany Section; Dr. W. S. T. Smith, Chairman Geology and Mineralogy Section: Professor W. B. Rising, Chairman Chemistry Section; Professor G. C. Edwards, Chairman Mathematics, Physics and Astronomy Section.

General Meetings.

September 8, 1898, Professor G. B. Halsted of the University of Texas—Japan.

October 13, Professor W. J. McGee of the Smithsonian Institution—The Influence of Science on National Progress.

October 14, Director J. E. Keeler of the Lick Observatory—Some Recent Applications of the Spectroscope to Astronomy.

November 15, Dr. W. L. Jepson—The Trees of California.

January 24, 1899, Professor A. C. Lawson—The Physical Features of Russia.

February 21, Mr. Charles A. Keeler—Familiar Birds of California.

March 7, Professor F. M. MacFarland of Stanford University—Some New Conceptions of the Architecture of the Nervous System.

May 10, Professor I. Stringham—The New Geometrical Cosmos.

August 29, Professor J. C. Merriam—Expedition to the John Day Fossil Fields.

September 1, Professor W. E. Ritter—The Harriman Alaskan Expedition.

October 30, Professor B. Willis, of the United States Geological Survey—The Physiography of Puget Sound.

November 14, Professor W. A. Setchell—A Botanical Trip to Alaska.

March 21, 1900, Mr. A. W. Whitney—Evolution and the Theory of Probabiltiy.

April 10, Professor A. C. Lawson—The Wyoming Geological Expedition.

May 2, Dr. E. J. Wilczynski—Poetry and Mathematics.

STRAUSS SCHOLARSHIP CLUB.

On March 4, 1898, those appointed to Levi Strauss Scholarships met at the lecture-room of Professor Jones, and the suggestion was made that some steps be taken by the scholarship holders to express their gratitude to Mr. Strauss. Accordingly, a committee was appointed to draw up suitable resolutions, and, in addition, it was voted to organize a permanent scholarship club. A committee was appointed to draft a constitution. At the next meeting the constitution was read and adopted and officers were elected as follows: Carl Warner, President; Mr. Miller, Vice-President; Miss Mary Burdick, Secretary; Miss Pearl Marshall, Treasurer.

The following resolution recommended by the committee was adopted:

"WHEREAS, Levi Strauss, Esq., on March 6, 1897, made provision for the support from the several Congressional districts of the State of a number of students at the University of California, who would be unable to enjoy the advantages offered by the University without such aid, thereby testifying to his appreciation of the work of the University, to his liberal devotion to the interests of the entire State, and to his sympathy with the endeavors and aspirations of youth;

"*Resolved*, That we, the first beneficiaries of his bounty, on the occasion of this first anniversary of the birthday of our Alma Mater since our appointment, feel that it is especially our honorable privilege to voice both our own personal gratitude to him who has made possible to us an education, and the universal esteem on the part of all the students of the University. In offering this slight token of words that would tell our hearts' esteem and affection for our benefactor, we express our trust that the true and real appreciation of his generous thoughtfulness will be shown by the right use we make of the opportunities he has placed within our reach, and by lives worthily and usefully spent; and that all Levi Strauss scholars, now and in after years, will strive to be noble exemplars of that modest demeanor, generous action, broad sympathy, and spotless honor typified by the name of Levi Strauss."

During the following term the club presented to Mr. Strauss a picture of Professor Joseph LeConte.

During the year 1899–1900 the club has held three meetings. Through its Reception Committee, it has endeavored to meet those newly appointed to Levi Strauss Scholarships and to bring them into active membership in the club. In accordance with its custom of bestowing upon Mr. Strauss yearly some token of its gratitude, it chose for this year a picture of President Wheeler.

LENA MAY MACAULAY,
Secretary.

STUDENTS' CONGRESS.

During the year 1898, and chiefly through the efforts of Speaker Charles E. Thomas, a change was made in the whole organization of the Congress for the purpose of sifting out all non-attending members. The change was followed by an increased interest in the work of the Congress and by a higher standard of debating. The Congress meets every two weeks, the question for debate being given out about two weeks in advance. The Speaker may appoint either three or four leaders on each side. Each speaker is allowed eight minutes. Before the last speaker on the negative closes, the question is thrown open to the house, each one speaking from the floor being allowed four minutes. After the affirmative closes, a vote of the house is taken. The leading event of the year is the annual debate with the Hastings College of the Law.

During the present year a change has been made in the method of procedure, the ministerial system prevailing in the English parliament having been substituted for the old method as far as practicable. Under this system the Congress is divided into two parties, one representing the government and the other the opposition. The government presents the question, and has the privilege of selecting committees, etc.

In general the Congress has been a large factor in shaping college thought; it has been the training school for debaters, and has furnished every year nearly all the contestants for the debating teams of the University of California. The object has been to foster clear and logical speaking, and a thorough acquaintance with parliamentary practice. J. F. QUINN, Speaker.

STUDENTS' COÖPERATIVE SOCIETY.

The growth of the business of the society during the past two years is shown by the following figures:

Increase in cash sales for 1898–99 over 1897–98	$5,375 02
Increase in cash sales for 1899–1900 over 1898–99	5,390 22

This shows an increase of about 40% over the preceding two years. The total for 1899–1900 was $37,300.

During that time the store was enlarged to twice its original size, and the general scope of the business extended to include laboratory supplies, photographic goods, mathematical and drawing instruments.

In July, 1899, Sub-station No. 2 of the Berkeley postoffice was established in the store for the convenience of the faculty and students in obtaining stamps and money orders and for registering mail. Carrier service has been extended to the University buildings and offices.

Exhibits of books recently published by the Macmillan Co., G. P. Putnam's Sons, Houghton, Mifflin & Co., Longmans, Green & Co., D. C. Heath & Co., Ginn & Co., and the Oxford University Press are maintained.

Beginning with the year 1899–1900 a new system was inaugurated whereby a record is kept of each member's purchases, and at the end of the year the surplus earnings are repaid to the members in proportion to the amounts of their purchases. This has proven very successful and makes the society purely coöperative.

We have secured the Pacific Coast agency for the Intercollegiate Bureau of Academic Costume and have supplied the faculty and graduating classes with caps and gowns. W. C. JURGENS, Manager.

UNIVERSITY OF CALIFORNIA SKETCH CLUB.

The University of California Sketch Club was organized in August, 1898, by five college men deeply interested in the success of the artistic side of the college publications. Since its organization, the membership has increased to a dozen, comprising almost all the Berkeley men directly interested in art. At first meetings were held in a barn on College avenue, but at the close of the first term the studio was transferred to Dana street, where meetings were held twice a week during the past year. Drawing from life has been the plan of work hitherto pursued, and the club has been singularly fortunate in having had poses by many of the University athletes, whose magnificent physiques offer opportunities for life-study which cannot be furnished by the stiff, conventional poses of art-school models. Realizing the importance of study from life, the young men comprising the club have labored earnestly to perfect themselves, and their progress is evidenced by better work and a higher grade of draughtsmanship in the college annual. This purpose has been foremost in the minds of the club members—to augment the scope and usefulness of college illustration. We believe we have the material, and are endeavoring to develop it in a coöperative sort of way.

J. RAYMOND CARTER,
President.

WOMEN'S FIELD CLUB.

The present Women's Field Club was organized in January, 1900, to take the place of the former Cross Country Club, which was disorganized after the spring of 1898. Atthe first meeting only a very few were present, but the numbers rapidly increased, and much enthusiasm was shown. Every other Saturday expeditions are made into the surrounding country, usually with some one of the University instructors as leader. The aim of the club is to inspire in its members a love for nature.

MARY EDITH MCGREW,
President.

YOUNG MENS' CHRISTIAN ASSOCIATION.

The Y. M. C. A. has made very extensive growth in the past two years and is in a promising condition. The aim of the organization is to promote Christian fellowship among its members, to train them in Christian service, and to promote aggressive Christian work, especially by and for students.

Through the generosity of Mrs. Ann Jane Stiles the University Christian Associations have a substantial and commodious building. Stiles Hall is headquarters for the work of the Christian associations and is freely used by all college organizations. Improvements costing $1,400 were provided for this year by donations of members, the students at large, and friends.

Active membership is limited to members of some evangelical church. There are now 233 active members. Associate membership is open to any student of good moral character. There are 116 associate members.

The Association Freshman reception is an annual event. There were present on August 24, 1900, over 750 guests, including the class of 1904, Y. M. C. A. and Y. W. C. A. members and Faculty representatives. Various reunions and socials are given throughout the year.

Bible study has become the most important work of the Association. A systematic, progressive, four-years course of study is given, under student leaders, on "The Life of Christ," "Acts and Epistles," "Old Testament Characters," and "Bible Doctrines." The classes range in size from ten to fifteen. The enrollment this year is 207. Religious meetings are held every Wednesday at 4 p. m.

Each year, under the International Committee, a Pacific Coast Students' Conference is held at Pacific Grove for ten days for consideration of Association methods and for study of Bible and missionary topics. Last year about eighty representatives of fifteen or twenty colleges in California, Nevada, Idaho, Washington, and Oregon were present. The delegation from this University was of thirty-three men in 1899. In 1900, owing to postponement, twenty-five men were present.

In West Berkeley boys' clubs carry on College Settlement work. Classes in civics, physiology, bookkeeping, and manual training have been formed. A well-equipped gymnasium under a competent instructor is maintained. The working force numbers about twenty-five.

In 1897 the Association assumed the work of the Students' Aid Society, which was designed to secure work for needy students. The work has grown rapidly. Over 200 men are making their way either wholly or in part. Many of these are aided by the bureau. Many are thus enabled to attend college who probably otherwise could not do so.

The General Secretary is the salaried officer of the Association. He sustains an advisory relation to the officers of the Association and has general supervision over the work. He is manager of the Employment Bureau, which occupies a large part of his time. Reno Hutchinson occupied the office from 1897 to 1899. Fred Cuttle was elected in August, 1900, for 1900–01.

The Board of Directors consists of three Faculty members, three business men, three alumni and three undergraduate members of the Association. This Board engages the General Secretary and has general supervision over his work.

FRED CUTTLE,
General Secretary.

COMPARATIVE TABLE.

DEPARTMENT.	1897.	1898.	1899.	1900.	REMARKS.
Bible Study:					
No. courses	1	2	3	3	
No. classes	4	4	7	13	
No. students enrolled	44	75	100	207	
Religious Meetings:					
Average attendance	35	38	60	75	
Missionary Department:					
No. study classes	......	1	1	2	
No. men enrolled	......	4	10	20	
Membership:					
Active	142	165	232	233	To Oct. 15
Associate	40	51	97	116	To Oct. 15
Total	182	216	329	340	
Employment Bureau:					
No. students registered	......	68	112	68	To Oct. 15
No. applications from citizens	.....	108	162	100	
No. applications filled	......	63	96	59	
Total value of work	.....	$1,104 05	$3,015 90	$962 05	From Aug. 15 to Oct. 15

YOUNG WOMEN'S CHRISTIAN ASSOCIATION.

The object of the Y. W. C. A. is the development of Christian character among the college young women, and preparation for active Christian service. The Bible Study department encourages systematic, intensive study of the Bible. Classes, under student leadership, have increased from three to nine, and membership from twenty-five, in 1898–99, to seventy-nine in 1899–1900. A course of lectures by college professors on New Testament subjects has been conducted by the Y. W. C. A. and Y. M. C. A. Religious meetings are held regularly on Tuesday, at four o'clock. The missionary work is of special interest. The student volunteer band consists of seven men and two women. The chairman of the Y. W. C. A. committee on the West Berkeley Girls' Clubs work is the leader of the work for girls in the college settlement.

In August, 1898, a three days' conference of Y. W. C. A. workers was held in Berkeley by the University of California women. In May, 1899, a conference of six days was held at Inverness, attended by seventeen University of California women and four from the University of Nevada. In May, 1900, a ten days' conference was held at Capitola. There were 115 delegates present from five States, representing twenty-five institutions, including six universities, those of Idaho, Washington, Oregon, Nevada, Stanford, and the University of California. It was owing to the kindness of Mrs. Hearst that many were able to go.

The association interests have grown so that it is found necessary to have a general secretary of the college organization. She has regular hours at Stiles Hall, and attends to business details.

The running expenses of the association are met by the dues of fifty cents per term which the members pay. Missionary money is given by the students themselves. During the last two years about $125 has been given by friends for carrying on the summer schools or conferences. Mrs. Hearst this year paid the expenses of the speakers, etc., making the burden lighter for the Berkeley association. Friends of the women students are asked for funds to pay the salary of the General Secretary. About $500 is needed to carry on the work of the year.

Ella M. Bunnell,
General Secretary.

Comparative Table.

	1898–1899.	1899–1900.
Meetings:		
Number held	31	31
Average attendance	45	63
Bible Study:		
Number of classes	7	9
Enrollment	70	79
Average attendance	49	56
Missionary Work:		
Number in study classes	6	12
Membership:		
Number in August	110	118
Increase in membership to May	43	90
Total membership	153	208

GIFTS TO THE UNIVERSITY.

Among the gifts to the University since the publication of the President's report for 1896–98 have been the following:

Mrs. Jane Krom Sather of Oakland, $75,000 in cash, stocks and real property for the endowment of the Jane K. Sather chair in some department of classical literature; real property, of the proceeds of the sale of which the first $10,000 is to be set aside as the Jane K. Sather Law and Library Fund, the income to be devoted to the perpetual support of a law library at the University by way of the purchase of law books and publications, the next $10,000 to be expended in the purchase of law books and publications, and any further surplus to be devoted to the advancement and support of the the teaching of law at the University (the income from these endowments to be paid to Mrs. Sather during her life); and $10,000 cash for the establishment of a Jane K. Sather Library Fund. Mrs. Sather has executed a deed conveying to President Wheeler in trust valuable property in Oakland, which upon her death is to be sold and the proceeds applied according to instructions contained in a sealed letter deposited in escrow in an Oakland bank.

Levi Strauss, a yearly gift since March 9, 1897, of $3,500 for the support of the twenty-eight Levi Strauss Scholarships, of the value of $125 each.

The family of the late Timothy Guy Phelps, long a Regent of the Uhiversity, a portrait bust of Regent Phelps by A. Le Jeune.

Charles Crocker, the expense of the Solar Eclipse Expedition sent to India from the Lick Observatory.

William H. Crocker, $1000 to defray the expense of a Solar Eclipse Expedition from the Lick Observatory to Southern Georgia.

Whitelaw Reid, 600 copies of the Charter Day Address for 1900.

John Simonds, President of the Simonds Saw Company, a Marsh steam pump of the latest improved pattern for the College of Mechanics.

E. H. Harriman, a totem-pole from Alaska.

Edward R. Shaw, of the School of Pedagogy of the University of New York, "Uber die Benutzing des bei Kindern so Thatigen Griebes beschatigt zu seyn."

Judge Curtis H. Lindley, Honorary Professor of the Laws of Mines and Water, a sheet-lead model of the workings of the Bunker Hill and Sullivan mines, in Idaho.

D. W. Balch, multiple filter for the cyanide process.

George Johnston and the Risdon Iron Works, by Superintendent R. S. Moore, a full-sized Johnston Concentrator for the Mining Laboratory.

Hon. James D. Phelan, Mayor of San Francisco, and Douglas Tilden, a statue of "The Football Players," offered as a prize to the University first winning two Stanford-California football games, and won for this University by the elevens of 1898 and 1899.

H. Hampshire, a badger for the Department of Zoölogy.

W. A. Magee, $40 for the purchase of geological specimens from the Lake Superior region.

Regents Denicke, Pardee, Houghton, and Anderson, a traveling fellowship in zoölogy, held by Harry Beal Torrey, M. S.

President Daniel C. Gilman, of the Johns Hopkins University, a sketch of San Francisco in 1849, and a portrait of Bishop Berkeley.

The International Geodetic Survey, a parcel of land in Mendocino County.

Regent Arthur Rodgers, Regent George C. Pardee, Mr. Louis Sloss, Mr. Lewis Gerstle, Regent A. B. Spreckels, and Regent J. F. Houghton, $50 each; Mr. J. K. Moffitt, Regent I. W. Hellman, and Mr. A. F. Morrison, $25 each; and a friend, $300, to defray the expense of a palaeontological expedition to the John Day fossil fields, in Eastern Oregon.

Mrs. J. C. Ainsworth, "Description de L'Egypte," a work undertaken by order of Napoleon I.

H. C. Lyon, 500 potted ferns, including many rare varieties.

Ralph C. Daniels, $150 for the establishment of the Ralph C. Daniels graduate fellowship.

W. R. Hearst, a collection of Greek and Egyptian antiquities.

W. R. Hearst, $1000 for the establishment of the "Examiner Traveling" Fellowship in Geography, held by W. C. Haswell.

Haywards High School; Girls' High School of San Francisco; Los Angeles High School; and A. Bonnheim, the support of scholarships in the University.

The Harvard Club of San Francisco, an annual scholarship at Harvard University for a graduate of the University of California.

The Pacific Mail Steamship Company, passage to Manila for the Traveling Fellow in Geography.

The John Martin Company, of San Francisco, a Stanley Integrating Wattmeter, manufactured by the Stanley Instrument Company, of Great Barrington, Mass.

Captain Henry Glass, Commandant of the United States Naval Training Station on Yerba Buena Island, an orchid from the Philippines.

David W. Loring, services as honorary instructor of the military band, as director of the University of California Glee Club, and as director of the Choral Society.

Dr. Robert A. McLean, a collection of 328 pathological specimens, busts of leaders of the medical profession, and cases for the museum of the Medical Department.

Dr. J. D. Arnold, 133 bound volumes and 600 unbound volumes for the library of the Medical Department.

Mrs. Beatrice Parke, 16 bound volumes of the *Scientific American* for the library of the Medical Department.

The Southern Pacific Company, the Santa Fe Company, the North Pacific Coast Railroad Company, the California Northwestern Railway Company, and the Pacific Coast Steamship Company, half-fare privileges for the school examiners of the University.

T. S. Brandegee and Señor Carlos Grabendorfer, a collection of Lower California plants, gathered in the neighborhood of San José del Cabo.

Dr. J. H. Stallard, a first prize of $100 and a second prize of $50 for essays upon the real meaning and value of the Declaration of Independence. Though the contest was open to students of both the University of California and the Leland

Stanford Junior University, essays were submitted only by students of this University.

The Alaska Commercial Company, an extensive and unique Alaskan collection of aboriginal implements and utensils, and geological, zoölogical, and botanical specimens.

The State Board of Harbor Commissioners, quarters in the east nave of the San Francisco Ferry Building for the Alaskan Museum.

Regent Ernst A. Denicke, $1,000 for the Library Fund.

Mrs. G. B. Grayson-Crane, the literary remains of Colonel Andrew J. Grayson, including manuscripts descriptive of the avifauna of Western Mexico, scientific correspondence, and other papers interesting in connection with the collection of 163 of Colonel Grayson's water colors of Mexican birds presented to the Library in 1878 by Mrs. Grayson-Crane.

Governor Theodore Roosevelt, an autograph copy of the New York Thanksgiving Proclamation of 1900.

Robert E. C. Stearns, Ph.D., formerly Secretary of the Board of Regents, a collection of University records.

Richard White, Esq., 100 volumes of agricultural classics, text books, and directories.

General and Mrs. John Bidwell, 75 books and pamphlets, mostly California and United States public documents.

Mrs. Beatrice Parke of Oakland, a collection of books, mostly works of travel.

Professor Albin Putzker, two photographs of the grave, in Athens, of George Morey Richardson, Ph.D., formerly of the Department of Greek.

Mr. George H. Mastick, a panorama of Rome as it was in 1728, consisting of twelve separate etchings, the work of G. Vasi, Count Palatine, trimmed and mounted as one.

Count Mutsu, Consul for Japan, "Report on the Adoption of the Gold Standard in Japan," compiled by Count Matsukata, Minister of Finance.

James Moffitt, Esq., two prizes of $200 each, offered to the winners of the intercollegiate debate, won in 1899 by the University of California and in 1900 by Stanford.

Irving M. Scott, Esq., the Scott prizes of $200 offered semi-annually to the winners of the University of California prize literary contests.

Mr. B. A. Barney of Menlo Park, a complete set of "The Breeder's Gazette" in thirty-six bound volumes.

Daniel C. Gilman, President of the Johns Hopkins University, a collection of autograph letters concerning the naming of Berkeley.

Hon. Horace Davis, formerly President of the University, a framed portrait of himself.

James K. Moffitt, Esq., $200 for the Library Fund, presented April 28, 1900. For the three preceding years Mr. Moffitt has sent an annual gift of $100.

Duc de Loubat, a reproduction by photo-chromography of the Mexican Manuscript (Vatican No. 3738).

Professor L. DuPont Syle, Mr. Victor Henderson, and the members of the cast of the Charter Day play for 1899, a framed photograph of a scene in "The Good Natured Man," and framed landscape and architectural photographs.

Professor L. DuPont Syle, Mr. S. A. Chambers, and the members of the cast of the Charter Day play for 1900, an engraving of the head of Huxley, a framed motto from Huxley's writings, and framed photographs of scenes in "Mademoiselle de la Seiglière."

Leonard Eugene Dickson, Ph.D., a number of mathematical papers.

J. K. Moffitt, Alex G. Eells, and others, a portrait of George Holmes Howison, Mills Professor of Intellectual and Moral Philosophy and Civil Polity, painted by Mrs. Richardson of San Francisco.

Professor A. P. Hayne, "Forestry Laws of the Philippine Islands."

Charles S. Capp, a Lincoln medal struck in 1865.

Professor William A. Setchell, a set of "Universities and Their Sons."

Charles J. Gedge of Carpenteria, forty volumes of philological literature.

Mortimer A. Davis, a framed print, from the original block, of the portrait of Christ by Claude Mellan.

Mrs. Charles S. Fairchild of New York, an invitation to the ball given in San Francisco in 1850 in honor of the admission of California to the Union.

H. H. Haight, Janet C. Haight, and Louis M. Haight, a marble bust of the late Governor H. H. Haight, who signed the charter of the University in 1868.

GIFTS TO THE HERBARIUM AND BOTANICAL MUSEUM.

W. P. Gibbons, Alameda; Mrs. B. Trask, Avalon; A. B. Leckenby, Bakersfield; Mrs. E. J. C. Gilbert, G. Hansen, Berkeley; Dr. D. P. Barrows, Claremont; Dr. M. A. Howe, Columbia University; L. Jared, Estrelia; S. W. Austin, Independence; Mrs. R. W. Wood, Inverness; Mrs. E. B. Campbell, Lick Observatory; F. W. Gunnison, Linden; A. Davidson, A. J. McClatchie, Los Angeles; J. W. Congdon, Maripose; F. W. Koch, Oakland; M. S. Baker, Sacramento; S. B. Parish, San Bernardino; Misses M. Reed and M. T. Reynolds, San Diego; Miss A. Eastwood, Mrs. P. Hearst, L. M. Loomis, San Francisco; Mrs. Gregory, San Jacinto; Mrs. D. O. Hunt, St. Helena; J. H. Barber, Santa Monica; Dr. H. E. Hasse, Soldiers' Home; W. A. Bolton, Tempe, Ariz.; C. D. Cobb, Tracy; C. Purdy, Ukiah; United States National Herbarium, Wishington, D. C.; F. T. Bioletti, W. C. Blasdale, H. P. Chandler, J. B. Davy, C. J. Fox, Jr., R. E. Gibbs, H. M. Hall, Dr. W. L. Jepson, Miss A. King, W. G. Klee, Dr. W. J. V. Osterhout, Dr. W. A. Setchell, University of California; Mrs. L. A. R. Peckinpah, Yountville.

LECTURES.

Prince André Poniatowski defrayed the expenses of a series of five lectures on "Recent French Literature," delivered in April, 1900, by M. Henri de Régnier of Paris.

Professor Walter T. Swingli of the Section of Seed and Plant Introduction of the United States Department of Agriculture addressed the Botanical Seminar on "Some Problems in Heredity."

W. W. Doble of the Doble Steel Works of San Francisco lectured before the mining students on "The Impact Wheel."

Alexander McAdie of the United States Weather Bureau delivered four lectures before the class in Modern Astronomy on "Meteorology."

Dr. H. W. Fairbanks delivered a series of University Extension lectures on "Some Important Events in the Geological History of the Pacific Coast."

Mrs. Anna Botsford Comstock lectured before the class in the Practice of Teaching, on February 17, on "Nature Study in the Schools."

Hon. Whitelaw Reid delivered a Charter Day address on "Present National Questions," March 23, 1900.

Professor Jacques Loeb of the University of Chicago lectured March 28 on his recent experiments in parthenogenesis.

Hiram Bingham Jr., M.A., delivered a series of University Extension lectures on "The Growth of Supremacy in the Hawaiian Islands."

Director Wilson and Chief Harper of the Bureau of Information of the Philadelphia Commercial Museum addressed the students on the work of the institution.

Judge William H. Taft, Chairman of the United States Philippine Commission, addressed the students on April 13, the day of the students' farewell to Professor Bernard Moses.

Rev. Robert J. Burdette delivered the annual public address before California Alpha of Phi Beta Kappa on May 15, 1900.

Professor H. Morse Stephens of Cornell Universiiy lectured for the Art Association on "Kipling."

Mr. Robert Furlong, Superintendent of Schools in Marin County, lectured before the class in School Supervision.

Professor F. W. Putnam of Harvard lectured before the Science Association, October 3, on "Anthropology."

President David Starr Jordan of the Leland Stanford Junior University spoke at the University meeting, October 12.

Father James O. S. Huntington, Superior of the Episcopal Order of the Holy Cross, addressed the students in history and political science, October 23, on "Personal Experiences in Tenement Houses and Coal Strikes;" and spoke on "The Meaning of Good Will," at the University meeting October 26.

Frederick W. Holls, Esq., counsel to the American Embassy to the Peace Conference at The Hague, spoke at the University meeting October 26 on the work of the conference.

Louis Dyer, M.A. (Oxon.), spoke on "Machiavelli and Modern Instances" at the University meeting, November 9.

Martin Kellogg, LL.D., Emeritus Professor of the Latin Language and Literature, spoke at the University meeting November 9.

Regent Alden Anderson spoke on "Arbitration" at the University meeting November 23.

John Barrett, formerly United States Minister to Siam, spoke before the Senate December 4 on Asiatic problems.

MRS. HEARST'S GIFTS.

A partial list of amounts donated or expenses incurred by Mrs. Phoebe A. Hearst in behalf of the University of California from October, 1897, to October, 1900:

The Hearst International Architectural Competition for permanent plans for the grounds and buildings of the University, $116,029.

Entertainment of the jurors for the Architectural Competition in Paris, Antwerp, and Amsterdam, $4,000.

Entertainment of the jurors in San Francisco, $5,000.

A medal commemorative of the competition, by Roty, $5,000.

Equipment for the Medical Department, $27,248.64, in partial detail as follows:

To the department of histology, fifty microscopes of the make of Bausch and Lomb, provided with two oculars and three objectives and fitted throughout with oil immersion lenses; two large thermostats; $3600.

To the department of bacteriology, twenty-five microscopes of the make of Leitz, large laboratory stands with movable stages, four oculars and four objectives, and fitted with oil immersion lenses; one Zeiss microscope, with five aprochromatic objectives and five compensation oculars; one large sterilizer; one culture thermostat; glass flasks, and various pieces of bacteriological apparatus; $2,850.

To the department of morphological pathology, fifty microscopes of the make of Leitz, large laboratory stands with movable stages, four oculars and four objectives, and fitted with oil immersion lenses; ten microtomes with universal clamp and mechanical feed; two large thermostats with individual compartments for sixty-five students; thirty-two sets of the Thoma-Zeiss hæmocytometer; thirty-two hæmoglobinometers; numerous articles of microscopic apparatus, 100 kilo of paraffin, and ten kilo of celloidin; $5,650.

To the department of chemical pathology (whose laboratory has been rebuilt by the medical department at a cost of $1,500), a complete equipment, with apparatus and reagents for a class of fifty students; $2,000.

To the laboratories of original research in pathology, four Zeiss microscopes of the largest pattern, fitted with six aprochromatic objectives and six compensating eye-pieces, one Nebelthau microscope, one binocular dissecting microscope, one Landolt-Lippich polariscope, one Weil polariscope, one Kirchhoff-Bunsen spectroscope, one Quincke spectroscope, one microspectroscope, one micropolariscope, one apparatus for monochromatic light, one Zeiss microprojection and microphotographic apparatus, four analytical balances, one Kossel-Rapps blood gas-pump, one Fischer calorimeter, one Zuntz-Gueppert respiration apparatus, five microtomes, including one Jung microtome for whole brain sections; four hundred museum jars, two sterilizers, two autoclaves, eight water thermostats, and two oil thermostats, one large automatic steam waterbath, and a large amount of general and special apparatus needed for original research (a large part of the apparatus is adapted to and available for original work in anatomy and physiology, as well as in pathology); $8,000.

Journey abroad of Dr. Alonzo E. Taylor, Professor of Pathology in the Medical Department, to purchase equipment for the medical laboratories.

Salary of Dr. Taylor as Professor of Pathology, $1,200 a year.

Hearst Hall, $30,474.27.

Mining laboratory, $13,109.97.

Extension to the gymnasium, $3,554.

Outfit for the women's gymnasium, $4,994.66.

Duplicate apparatus for the Harmon gymnasium, $1,000.

Expenses of Professor and Mrs. Walter E. Magee for a journey of inspection to Eastern gymnasiums, $844.

Equipment of two club houses for women students. $2,000.

The Hearst Domestic Industries, $3,500.

Equipment of the ladies' room in East Hall, $1,200.

Lighting of the University grounds and library (in the year 1897–98), $2,720.

For the archæological museum: Excavations in Egypt by Dr. George A. Reisner for five years from September 1, 1899, $10,000 a year (on Dr. Reisner's excavations $15,833.33 has already been expended, for Mr. Grenfell's excavations in the Fayum, $2,503.75); excavations in South America and Yucatan by Dr. Max Uhle for five years from March 1, 1899, $3,500 a year; excavations and purchases for the cabinet of classical antiquities by Professor Alfred Emerson, two years from

April 1, 1900, $10,000 a year; excavations and purchases in California, old Mexico, and New Mexico by Dr. Philip Mills Jones, $6,000 a year.

A collection of Egyptian antiquities, $5,000.

Lectures by Dr. Alfred Emerson on "Greek Archæology."

Lectures on "The Mycenaean Age," by Louis Dyer, M.A. *(Oxon.)*, of Oxford, England, $1,000. (Lectures at the University and in Extension courses, $750; expenses, $250.)

Scholarships: Phœbe A. Hearst scholarships:—1895, $2,600; 1896, $470; 1897, $5,700; 1898, $5,100; 1899, $4,800; 1900, $1,400.

Foreign traveling fellowships from 1897 to 1900, inclusive, $5,950 a year.

Salary of Mrs. Mary Bennett Ritter, M. D., woman physician in the University, $1,200 a year; for two years, $2,400.

Expenses of Dr. Ritter for a journey to Eastern colleges to investigate matters concerning the life and work of women students, $423.91.

For instruction in hygiene: Models of the human body, $127.67; reference books, $11; food museum (Pratt Institute), $28; partial skeleton, $13.50; food charts, $2; student labor, $2.25; anatomical charts, $41.67. Total, $226.09.

Subscription toward the University of California's share of the endowment fund for the American School of Classical Studies in Athens, Greece, $1,000.

Fifty mounted mammalian skeletons for the zoölogical museum, $1,200.

Piranesi's Opere.

The destroyed-plate edition, in ten volumes, of "The World's Best Orations," $200.

A stand of colors for the University cadets, $200.

A collection of framed photographs and engravings for the walls of Stiles Hall.

A series of concerts, dinners, and receptions for the members of the University at Hearst Hall from December, 1899, to May, 1900, and the use of Hearst Hall and its appurtenances for student rallies, concerts, dances, society meetings, plays, debates, etc.

A collection of stereopticon slides illustrating classical subjects.

Distribution of a reprint of an article by Charles S. Green, on the University of California.

Prizes for the University Magazine literary competition, $150.

Total of the gifts *for which figures have been given in the foregoing list* (exclusive of the support of the archæological expeditions,—about $30,000 a year), $271,566.65. This amount, however, is far less than what Mrs. Hearst has actually expended for the benefit, direct or indirect, of the university.

CHANGES IN THE FACULTY (FOR THE ACADEMIC YEAR 1899–1900).*

APPOINTMENTS AND PROMOTIONS.

1899.

July 1—A. S. King, Clerk in Recorder's Office.[1]

Aug. 8—Frank E. Ross, Assistant in Mathematics.[2]

Sept. 12—J. A. Rowell, Evening Assistant in the Library.[1]

W. H. Alexander, Reader in Latin.[1]

D. Winter, Honorary Fellow in English Composition.[1]

Oct. 17—F. T. Bioletti, Instructor in Charge of Viticulture, Olive Culture and Bacteriology.[2]

W. L. Jepson, Assistant Professor of Botany.[2]

A. F. Lange, Associate Professor of English and Scandinavian Philology.[3]

J. C. Merriam, Assistant Professor of Palaeontology and Historical Geology.[2]

K. C. Babcock, Assistant Professor of History and Political Science.[2]

T. W. Page, Assistant Professor of History and Economics.[2]

A. C. Lawson, Professor of Mineralogy and Geology.[2]

P. G. Nutting, Assistant in Physics.[2]

N. L. Perry, Instructor in Mathematics.[2]

E. N. Prouty, Instructor in Civil Engineering.[2]

A. E. Chandler, Graduate Assistant in Civil Engineering.[1]

Joseph A. Landerville, Instructor in Cabinet-making, Wilmerding School.[1]

Fritz J. Lindburg, Instructor in Blacksmithing, Wilmerding School.[1]

Arthur W. Gray, Instructor in Arithmetic, Algebra, Geometry, Trigonometry, and Physics, Wilmerding School.[1]

Felix Peano, Instructor in Principles of Art, Design, Freehand Drawing, and Modeling, Wilmerding School.[1]

Dr. Thomas W. Huntington, Associate Professor of Clinical and Operative Surgery (M.)[2]

Dr. John M. Williamson, Professor of Genito-Urinary Surgery and Clinician in Genito-Urinary Surgery in the Out-Patient Department (M.)[2]

Dr. Harry M. Sherman, Professor of the Principles and Practice of Surgery (M.)[3]

Dr. Alonzo E. Taylor, Professor of Pathology (M.)[1]

Dr. Herbert C. Moffitt, Lecturer on the Principles and Practice of Medicine (M.)[1]

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*For changes during the year 1898–99 see Annual Report of the Secretary to the Board of Regents for the year ending June 30, 1899. In this list (1) signifies new appointment, (2) promotion, (3) change of title, and (4) that one man holds two titles.

Oct. 17—Dr. J. Henry Barbat, Instructor in Surgery and Surgical Anatomy (M.)[1]

Dr. Wallace I. Terry, Assistant in Clinical Surgery (M.)[1]

Dr. R. T. Legge, Assistant in Materia Medica (M.)[1]

Dr. Edward von Adelung, Jr., Instructor in Nervous Diseases and Assistant in the Clinic on Nervous Diseases in the Out-Patient Department (M.)[1]

Dr. Stephen Cleary, Demonstrator of Anatomy (M.)[1]

Dr. C. D. McGettigan, Demonstrator of Anatomy (M.)[1]

Dr. John C. Spencer, Clinician on Genito-Urinary Surgery, Out-Patient Department (M.)[1]

Dr. Leo Newmark, Clinical Lecturer on Nervous Diseases (M.)[3]

Dr. William J. Hawkins, Instructor in Physiology (M.)[1]

Dr. Richard M. H. Berndt, Instructor in Therapeutics (M.)[1]

Dr. Thomas B. W. Leland, Instructor in Physiology (M.)[1]

Dr. Philip Mills Jones, Instructor in Electro-Therapeutics and Librarian (M.)[1]

Dr. James F. McCone, Instructor in Obstetrics (M.)[1]

Dr. Hugh Lagan, Assistant in Clinical Surgery, and Assistant in the Eye and Ear Clinic, Out-Patient Department (M.)[1]

Dr. Charles L. Morgan, Instructor in Materia Medica (M.)[1]

Dr. Henry A. L. Ryfkogel, Instructor in Bacteriology, Director of the Clinical Laboratory, and Assistant Curator (M.)[1]

Dr. J. Mora Moss, Chief of the Clinic on Medicine, Out-Patient Department (M.)[1]

Dr. Daniel E. F. Easton, Chief of the Clinic on Medicine, Out-Patient Department (M.)[2]

Dr. Clarence Quinan, Chief of the Clinic on Medicine, Out-Patient Department (M.)[1]

Dr. Frank R. Dray, Assistant in the Clinic on Medicine, Out-Patient Department (M.)[1]

Dr. Sanford Blum, Assistant in the Clinic on Medicine, Out-Patient Department (M.)[1]

Dr. Henry B. A. Kugeler, Chief of the Clinic on Surgery, Out-Patient Department (M.)[1]

Dr. M. B. Ryer, Assistant in the Clinic on Surgery, Out-Patient Department (M.)[1]

Dr. James P. H. Dunn, Assistant in the Clinic on Surgery, Out-Patient Department (M.)[3]

Dr. Harold Brunn, Assistant in the Clinic on Surgery, Out-Patient Department (M.)[1]

Dr. Cecil M. Armistead, Assistant in Clinic on Genito-Urinary Surgery, Out-Patient Department (M.)[1]

Dr. George H. Powers, Clinician in Eye and Ear Clinic (M.)[3]

Dr. George W. Merritt, Chief of Clinic on Eye and Ear, Out-Patient Department (M.)[3]

Dr. Robt. H. Orr, Assistant in Eye and Ear Clinic, Out-Patient Department (M.)[1]

Dr. Grace Feder, Assistant in Eye and Ear Clinic, Out-Patient Department (M.)[1]

Dr. George H. Powers, Clinician in Nose and Throat Clinic, Out-Patient Department (M.)[4]

Oct. 17—Dr. Charles A. von Hoffmann, Clinician in Clinic on Gynecology, Out-Patient Department (M.)[3]
Dr. James F. McCone, Chief of Clinic on Gynecology, Out-Patient Department (M.)[4]
Dr. M. B. Ryer, Assistant in the Clinic on Gynecology, Out-Patient Department (M.)[4]
Dr. Douglass W. Montgomery, Clinician in the Clinic on Diseases of the Skin, Out-Patient Department (M.)[3]
Dr. Alfred B. Grosse, Assistant in the Clinic on Diseases of the Skin, Out-Patient Department (M.)[1]
Dr. Ernest Pring, Assistant in the Clinic on Diseases of the Skin, Out-Patient Department (M.)[1]
Dr. S. J. Hunkin, Chief of the Clinic on Orthopedic Surgery, Out-Patient Department (M.)[3]
Dr. Henry du R. Phelan, Chief of the Clinic on Orthopedic Surgery, Out-Patient Department (M.)[1]
Dr. John J. Flood, Assistant in the Clinic on Orthopedic Surgery, Out-Patient Department (M.)[1]
Dr. Eleanor M. Stow, Assistant in the Clinic on Orthopedic Surgery, Out-Patient Department (M.)[1]
L. F. Chesebrough, Instructor in Mechanic Arts.[3]
William Scott Ferguson, Instructor in Grecian and Roman History.[1]
Frank Soulé, Acting Professor of Military Science and Tactics.[4]
Isaac Flagg, Associate Professor of Greek.[3]

Dec. 12—G. De Lisle, Assistant in Mechanical Engineering.[1]
Edward Booth, Instructor in Chemistry.[2]
D. G. Aplin, Assistant in Chemistry.[1]
J. C. Christensen, Assistant in Chemistry.[1]
R. H. Collins, Assistant in Chemistry.[1]
F. H. Cuttle, Assistant in Chemistry.[1]
D. H. Biggs, Instructor in Wood-carving (Wilmerding School).[1]
Marion Adams, Teacher of English, History, and Geography (Wilmerding School).[1]
Bertha Noltemeier, Stenographer and Assistant Instructor in Mechanical Drawing (Wilmerding School).[1]
S. W. Hemenway, Teacher of Mechanical and Architectural Drawing (Wilmerding School).[1]
Carl Peterson, Janitor (Wilmerding School).[1]
W. T. Skilling, Assistant in Physics.[1]
F. J. Snow, Student Assistant in Agricultural Laboratory.[1]
F. W. Bancroft, Instructor in Physiology.[1]
Adelaide Hobe, Student Assistant in Practical Astronomy.[1]
D. W. Loring, Instructor of the Military Band.[1]
William A. Hackley, Honorary Fellow in Pedagogy.[1]
H. T. A. Hus, Honorary Fellow in French.[1]
Carl Rimbach, Honorary Fellow in Agriculture.[1]
Henry C. Myers, Honorary Fellow in Chemistry.[1]
Harry Beal Torrey, Traveling Fellow.[3]

Dec. 26—Victor Hendricks Henderson, President's Secretary.[1]

1900.

Jan. 25—A. E. Chandler, Instructor in Civil Engineering.[2]
F. C. Calkins, Assistant in Mineralogy.[1]
J. H. Stutt, Student Assistant in Civil Engineering.[1]
W. A. Shuey, Student Assistant in Library.[1]
W. R. Hodgkin, Student Assistant in Library.[1]
C. H. Harwood, Student Assistant in Library.[1]
R. E. Gibbs, Student Assistant in Library.[1]
W. H. Gorrill, Honorary Instructor in Jurisprudence.[1]

Feb. 1—Dr. L. L. Dunbar, Emeritus Professor (D.)[2]
Dr. F. W. Sharpe, Professor of Prosthetic Dentistry (D.)[3]

Mar. 13—F. Laist, Assistant in Chemistry.[1]
J. H. Stutt, Graduate Assistant in Civil Engineering.[2]
F. L. Burkhalter, Student Assistant in Civil Engineering.[1]
Dr. Wilson J. Shiels, Professor of Internal Medicine (P.)[1]
Dr. T. B. W. Leland, Professor of Internal Medicine (P.)[2]
Dr. J. A. Black, Professor of Gynecology (P.)[1]
Dr. Conrad Weil, Professor of Surgery (P.)[1]
Dr. S. M. Mouser, Professor of Bacteriology (P.)[1]

May 8—Harry P. Carlton, D.D.S., Professor of Operative Dentistry, (D.)[1]
Carroll Fowler, Assistant in Entomology.[1]
G. E. Colby, Instructor in Agricultural Laboratory.[3]
A. M. dal Piaz, Assistant in Viticulture and Horticulture.[3]
A. A. Lawson, Assistant in Botany.[1]
Roger Sherman Phelps, Assistant in English.[1]
D. Winter, Assistant in English.[3]
D. A. McRae, Reader in Greek.[1]
A. C. Miller, Professor of Finance.[1]
H. Morse Stephens, Lecturer in Modern History.[1]
George H. Boke, Instructor in Jurisprudence.[1]
I. M. Linforth, Assistant in Latin.[1]
Derrick N. Lehmer, Instructor in Mathematics.[1]
D. R. Curtiss, Assistant in Mathematics.[1]
H. Kower, Assistant Professor of Instrumental Drawing.[3]
J. N. LeConte, Instructor in Mechanics.[3]
G. De Lisle, Assistant in Mechanics.[3]
W. A. Lynn, Instructor in Electrical Engineering.[2]
James D. Mortimer, Assistant in Electrical Engineering.[1]
A. C. Babson, Assistant in Electrical Engineering.[1]
W. S. Morley, Instructor in Assaying, and Mill Assistant.[2]
G. J. Young, Analytical Assistant.[1]
Walter N. Fong, Chinese Assistant.[1]
Yoshi Saburo Kuno, Japanese Assistant.[3]
Mary B. Ritter, Medical Examiner of Women, and Lecturer on the Hygiene of Women.[3]
Harry P. Carlton, D.D.S., Professor of Operative Dentistry (D.)[1]
Floyd R. Watson, Traveling Fellow in Physics.[3]

May 15—George Bulkeley Wakeman, Instructor in History.[1]
Miss Adelaide M. Hobe, Assistant in Astronomy.[2]
S. C. Phipps, Assistant in Astronomy.[1]

May 22—E. M. Blake, Instructor in Mathematics.[1]
J. A. Rowell, Assistant in the Library.[3]
G. W. Merritt, M. D., Professor of Ophthalmology (P.)[3]
S. N. Androus, Patron of South California Experiment Station.[1]

June 12—J. H. Barber, Foreman South Coast Range Station.[3]
J. W. Neal, Foreman Foothill Station.[3]
E. C. Moore, Instructor in Philosophy, one-half time to be devoted to Department of Education.[3]
W. P. Montague, Instructor in Logic and the Theory of Knowledge.[3]
E. P. Lewis, Assistant Professor of Physics.[3]
N. L. Gardner, Assistant in Botany.[1]
Leroy Anderson, Instructor in Dairy Husbandry.[1]
W. J. Wythe, Instructor in Drawing.[1]
W. P. Boynton, Honorary Instructor in Physics.[3]
L. D. Syle, Associate Professor of English Literature.[3]
W. D. Armes, Assistant Professor of English Literature.[3]
Hermann Kower, Assistant Professor of Drawing.[3]
F. V. Paget, Professor of Romanic Languages and Literatures.[3]
T. L. Heaton, Assistant in Education.[3]
William F. Belfrage, Instructor in Mathematics in the Wilmerding School.[1]
Joseph Dupuy Hodgen, D. D. S., Professor of Chemistry and Metallurgy (D.)[1]
Alice Robertson, LeConte Fellow.[1]
Knight Dunlap, LeConte Fellow.[1]

RESIGNATIONS.

L. E. Dickson, Assistant Professor of Mathematics. (Accepted July 11, 1899.)

Clarence R. Weymouth, Assistant in Mechanical Engineering. (Accepted August 8, 1899.)

R. S. Norris, Instructor in Chemistry. (Accepted August 8, 1899.)

F. E. Ross, Assistant in Mathematics. (Accepted September 12, 1899.)

Dr. John C. Spencer, Professor of Pathology and Histology in the Medical Department. (Accepted October 17, 1899.)

Arthur W. Gray, Assistant in Physics. (Accepted December 12, 1899.)

F. E. Frey, Student Assistant in Civil Engineering and Astronomy. (Accepted December 12, 1899.)

E. N. Prouty, Instructor in Civil Engineering. (Accepted January 25, 1900.)

G. D. Louderback, Assistant in Mineralogy. (Accepted January 25, 1900.)

Dr. L. L. Dunbar, Professor of Operative Dentistry and Dental Histology, and Dean of the Dental Faculty. (Accepted February 1, 1900.)

D. G. Aplin, Assistant in Chemistry. (Accepted March 13, 1900.)

Dr. W. E. Hopkins, from the Postgraduate Medical Department. (Accepted March 13, 1900.)

Frank Soulé, Acting Professor of Military Science and Tactics. (Accepted May 22, 1900.)

A. L. Lengfeld, M.D., Professor of Chemistry and Metallurgy in the College of Dentistry. (Accepted June 12, 1900.)

LEAVES OF ABSENCE.

1899–1900.

1899.

Sept. 12—A. P. Hayne, Assistant Professor of Viticulture and Orange Culture, from September 21, 1899, to October 12, 1899.

George Davidson, Professor of Geography, for six weeks, without loss of pay.

Oct. 17—H. H. Hirst, Instructor in Civil Engineering, for one year.

Martin Kellogg, Emeritus Professor of Latin Language and Literature, for one year.

Dec. 12—Harry Beal Torrey, Instructor in Zoölogy, from January 1 to July 1, 1900.

Curtis H. Lindley, Honorary Professor of the Law of Mines and Water, for the balance of the University year.

J. C. Rowell, Librarian, from May 15, 1900, to January 15, 1901, with full pay.

C. K. Jones, Reference Librarian, from January 1, 1900, to July 1, 1900, on half pay.

A. F. Lange, Associate Professor of English and Scandinavian Philology, for the year 1900–1901, with full pay.

1900.

Jan. 25—Joseph LeConte, Professor of Geology and Natural History, for the year 1900–1901, on two-thirds pay.

William Carey Jones, Professor of Jurisprudence, for the year 1900–1901, on two-thirds pay.

E. W. Davis, Secretary of the Board of Regents, until further action.

Feb. 1—Walter E. Magee, Assistant Professor and Director of Physical Culture, until the end of February, 1900, with full pay.

Mrs. Genevra E. Magee, Assistant in Physical Culture, until the end of February, 1900, with full pay.

Mar. 13—W. B. Rising, Professor of Chemistry, from the opening of the term to the beginning of October, 1900, with full pay.

Irving Stringham, Professor of Mathematics, leave extended to September 1, 1900, with full pay.

Thomas P. Bailey, Associate Professor of Education as Related to Character, from April 1 to the end of the term, with full pay.

C. L. Cory, Associate Professor of Electrical Engineering, for one year from July 1, 1900.

May 8—C. W. Woodworth, Assistant Professor of Entomology, for one year from July 1, 1900, on two-thirds pay.

Bernard Moses, Professor of History and Political Economy, for one year from July 1, 1900.

DEATHS.

Stephen Johnson Field, LL.D., Honorary Professor of Law since 1870, in Washington, D. C., April 9, 1899.

Timothy Guy Phelps, Regent of the University since 1880, at San Carlos, June 11, 1899.

J. West Martin, Regent of the University from 1871 to 1898, in Oakland, August 18, 1899.

Harry Herbert Hirst, B.S., Instructor in Civil Engineering since August 13, 1895, in San Francisco, December 23, 1899.

Albert Miller, Regent of the University since 1887, in Oakland, April 16, 1900.

Andrew S. Hallidie, Regent of the University since 1868, in San Francisco, April 24, 1900.

James Edward Keeler, A.B., Sc.D., Director of the Lick Observatory since March 8, 1898, in San Francisco, August 12, 1900.

William Thomas Welcker, Graduate U. S. Military Acadamy, Professor of Mathematics, 1869–81; Emeritus Professor of Mathematics since May 10, 1898; in Berkeley, November 3, 1900.

Everett Schwartz, Director of the Wilmerding School, in San Francisco, November 22, 1900.

PUBLISHED WRITINGS OF MEMBERS OF THE FACULTY.

[NOTE.—Officers of Colleges or Departments situated elsewhere than in Berkeley are designated by an abbreviation following the title, *viz.:* (LO) Lick Observatory, (H) Mark Hopkins Institute of Art, (L) Hastings College of the Law, (M) Medical Department, (P) Post-Graduate Medical Department, (D) Dental Department, (Ph) California College of Pharmacy, (V) Veterinary Department.]

CHARLES THOMAS ABBOTT, M.D.

Assistant Clinician (P.)

Cliff Dweller's Daughter. New York. F. Tennyson Neely, June, 1899.

LEROY ANDERSON, M.S.,

Instructor in Dairy Husbandry.

Cornell University Agricultural Experiment Station Bulletins.
- No. 152, Studies in Milk Secretion, drawn from Officially Authenticated Tests of Holstein Friesian Cows [with Henry H. Wing] October, 1898.
- No. 169, Studies in Milk Secretion, drawn from the Records of the University Herd [with Henry H. Wing] May, 1899.
- No. 173, Relation of Food to Milk Fat, November, 1899.
- No. 183, Sugar Beet Pulp as a Food for Cows [with Henry H. Wing] September, 1900.

Correspondent for the *Rural New Yorker* on Animal and Dairy Husbandry subjects since 1897.

WINSLOW ANDERSON, M.D.,

Secretary Board of Trustees (V.)

Bubonic Plague. *Pac. Med. Jour.*, July, 1900, pp. 517–521.

WILLIAM DALLAM ARMES, M.L.,

Assistant Professor of English Literature.

Douglas Tilden, Sculptor. *Overland Monthly*, 1898, Vol. 31, p. 141.

The Principal Works of George Meredith—A Brief Bibliography. *Monthly Bulletin* of the Oakland Free Library. Reprinted, with additions, in pamphlet form.

Errors in Allibone. *Library Jour.*, October, 1898, Vol. 23, p. 563.

KENDRIC CHARLES BABCOCK, Ph.D.,

Assistant Professor of History and Political Science.

The Condition of History in the Secondary Schools of California. *Univ. Chronicle*, Vol. 3, p. 51, February, 1900.

The Church and Workingmen. *Pacific Unitarian*, Vol. 8, p. 181, April, 1900.

The Purpose and Organization of Alumni Chapters. *The Rainbow of Delta Tau Delta*, Vol. 23, p. 105, January, 1900.

(Several other articles in the same magazine in the last six years).

CHARLES MONTAGUE BAKEWELL, Ph.D.,

Associate Professor of Philosophy.

Pluralism and the Credentials of Monism. *The Philosophical Review*, July, 1898, Vol. 8, p. 355.

The Faith Cure of Pessimism. *Univ. Chronicle*, 1898, Vol. 1, p. 92.

The University of Paris. *Univ. of Cal. Magazine*, 1898, Vol. 4, p. 345.

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The New Egoism and its German Prophet. *The Ethical Record*, October, 1900, p. 20.

Reviews of Books (Partial List):

- The Life of Renan, by Mme. Darmesteter. *The New World*, 1898, Vol. 7, p. 190.
- L'Individualité et l'erreur individualiste, by Felix le Dantec. *The New World*, 1899, Vol. 8, p. 751.
- Citizenship and Salvation, by A. H. Lloyd. *The Psychol. Review*, 1899, Vol. 6, p. 312.
- Destinée de l'homme, by M. L'Abbé C. Piat. *The Philosophical Review*, 1899, Vol. 8, p. 664.
- Essai d'une Philosophie nouvelle suggérée par la Science, by Léonce Ribert. *The Philosophical Review*, 1900, Vol. 9, p. 226.
- History of Ancient Philosophy, by W. Windelband, tr. by Cushman. *The International Jour. of Ethics*, 1900, Vol. 10, p. 407.

FRANK WATTS BANCROFT, PH.D.,

Instructor in Physiology.

The Venomotor Nerves of the Hind Limb. *Amer. Jour. Physiology*, July, 1898, Vol. 1, No. 4.

The Anatomy of Chelyosoma Productum Stimpson. *Proc. Cal. Acad. Sciences*, October 5, 1898, Series 3, Vol. 1, No. 8.

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A New Function of the Vascular Ampullae in the Botryllidae. *Zoölogischer Anzeiger* Bd. 22, November 15, 1899, No. 601, p. 450.

JOHN HENRY BARBAT, PH.G., M.D.,

Instructor in Surgery and Surgical Anatomy (M.)

Intestinal Anastomosis. *Jour. Amer. Med. Assoc.*, July 15, 1899.

A few Notes on Appendicitis. *Transactions of the Cal. State Med. Soc.*, 1900.

JOHN HENRY BARBER,

Foreman South Coast Range Agricultural Experiment Station (Paso Robles).

San Gabriel Forest Reservation. *Forester*, December, 1898, Vol. 4, No. 12, p. 240.
Camping in a Forest Reservation. *Overland Monthly*, May, 1899, Vol. 33, No. 197, p. 449.
Sundry short articles on horticultural, farming and forestry topics in *Rural Californian*, *Pacific Rural Press*, *American Agriculturist*, and local press.

LOUIS BAZET, M.D.

Professor of Genito-Urinary Surgery (P.)

Treatise on Consumption. Read before the State Board of Health, January, 1900.
Prophylaxis of Tuberculosis. Read before the State Board of Health, February 23, 1900.
A Sanatorium for Indigent Consumptives. Read before the San Francisco Board of Health, October, 1900.

GEORGE WILLIAM BEATTIE, B.S.,

Reader in Chemistry.

The California Constitution and the High School. *Proc. So. Cal. Teachers' Assoc.*, 1898.
Examinations versus Credentials. *Proc. Cal. State Teachers' Assoc.*, 1899.
The State and High Schools. *Western Jour. Educ.*, January, 1900.
Certification of Teachers. (Read before Cal. Ed. Commission.) *Western Jour. of Education*, May, 1900, p. 21.

FREDERIC THEODORE BIOLETTI, M.S.,

Instructor in Charge of Viticulture, Olive Culture, and Bacteriology.

The Olive Knot. *Bull. 120, Agr. Exp. Sta.*, U. C.
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EDWIN MORTIMER BLAKE, Ph.D.,

Instructor in Mathematics.

Upon the ruled surfaces generated by the plane movements whose centrodes are congruent conics tangent at homologous points. *Amer. Jour. Math.*, 1899, Vol. 21, pp. 257–269.

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SANFORD BLUM, A.B., M.D.,

Assistant Clinician (M.)

Ueber experimentelle Erzeugung von Endocarditis tuberculosa [with Dr. M. Michaelis]. *Deutsche Med. Wochenschrift*, 1898, No. 35.

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WILLIAM BRADFORD BOSLEY, A.B., LL.B.,

Special Lecturer (L.)

The Constitutional Requirement of Uniformity in Duties, Imposts and Excises. *Yale Law Journal*, February, 1900, Vol. 9, No. 4, p. 164.

WILLIAM PINGRY BOYNTON, Ph.D.,

Honorary Instructor in Physics.

Gibbs' Thermodynamical Model. *Nature*, March 1, 1900, and *Phys. Rev.*, April, 1900, Vol. 10, No. 4, pp. 228–233.

Gibbs' Thermodynamical Model for a Substance Following Van der Waals' Equation. To appear shortly in the *Phys. Rev.*

CORNELIUS BEACH BRADLEY, M.A.,

Professor of Rhetoric.

The English Essay: Its Development and Some of its Perfected Types. *Univ. Chronicle*, October, 1898, Vol. 1, p. 383.

English Studies in Literature for Adult Classes. I, *Univ. Chronicle*, December, 1898, Vol. 1, p. 515; II and III, February, 1899, Vol. 2, p. 17. The whole was also published as a *Library Bulletin.*

Exploration of the East Creek Amphitheater. *Sierra Club Bulletin*, January, 1899, Vol. 2, p. 270.

ELMER ELLSWORTH BROWN, Ph.D.,

Professor of the Theory and Practice of Education.

Report of the Committee on Education of the Good Government Club. A folder published by the Club, April 6, 1899.

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WILLIAM WALLACE CAMPBELL, Sc.D.,

Astronomer (LO.)

Spectroscopic Notes: The Harvard Star *L* Centauri; The Spectrum of Mars; Comet 1895 IV (Perrine); Comet 1895 V (Brooks); Comet 1896 I (Perrine); Comet 1896 III (Swift); Comet 1889–96 (Brooks-Javelle); Nova Aurigae. *Aph. Jour.*, Vol. 5, p. 233.

Mr. Lowell's Book on Mars. *Science*, Vol. 4, p. 455.

On the variations observed in the spectrum of the Orion Nebula. *Aph. Jour.*, Vol. 6, p. 363.

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The Solar Corona of January 22, 1898. *Publ. A. S. P.*, Vol. 10, opp. 97.

A general account of the Lick Observatory-Crocker Eclipse Expedition to India. *Publ. A. S. P.*, Vol. 10, p. 127.

The Mills Spectrograph of the Lick Observatory. *Aph. Jour.*, Vol. 8, p. 123.

Some Stars with great velocities in the line of sight. *Aph. Jour.*, Vol. 8, p. 157.

The variable velocity of η Pegasi. *Aph. Jour.*, Vol. 8, p. 159.

The motion of η Cephei in the line of sight. *Aph. Jour.*, Vol. 8, p. 184.

The Purkinje Phenomenon and the Spectrum of the Orion Nebula. *Ast. Nach.*, Vol. 147. *Aph. Jour.* Vol. 8, p. 317.

The variable velocity of o Leonis in the line of sight. *Aph. Jour.*, Vol. 8, p. 291.

The variable velocity of χ Draconis in the line of sight. *Aph. Jour.*, Vol. 8, p. 292.

The Variable Velocity of ζ Geminorum in the Line of Sight. *Aph. Jour.*, Vol. 9, p. 86.

Three new Spectroscopic Binary Stars. *Publ. A. S. P.*, Vol. 11, p. 54.

The Elements of Practical Astronomy. New York, The Macmillan Co., 1899, 8vo., pp. 264 + xxii.

The Origin of the Principal Line in the Aurora Spectrum. *Publ. A. S. P.*, Vol. 11, p. 51.

Notes on the Spectrum of o Ceti. *Aph. Jour* , Vol. 9, p. 31.

The variable velocity of Iota Pegasi in the line of sight. *Aph. Jour.*, Vol. 9, p. 310.

The variable velocity of θ Draconis in the line of sight. *Ibid.*, Vol. 9, p. 311.

On the Visible Spectrum of Nova Sagittarii. *Aph. Jour.*, Vol. 9, p. 308.

A Comparison of the Visual Hydrogen Spectra of the Orion Nebula and of a Geissler Tube. *Aph. Jour.*, Vol. 9, p. 312.

The Variable Velocities in the Line of Sight of ϵ Librae, h Draconis, λ Andromedae, ϵ Ursae Minoris and ω Draconis. *Aph. Jour.*, Vol. 10, p. 178.

The Influence of the Purkinje Phenomenon on the Observations of Faint Spectra. *Aph. Jour.*, Vol. 10, p. 22.

The Spectroscopic Binary Capella. *Aph. Jour.*, Vol. 10, p. 177.

The Variable Velocity of α Ursae Minoris in the Line of Sight. *Aph. Jour.*, Vol. 10, p. 180.

On the Variable Velocity of Polaris in the Line of Sight. *Publ. A. S. P.*, Vol. 11, p. 195.

The Wave-Length of the Green Coronal Line and other Data Resulting from an attempt to determine the Law of Rotation of the Solar Corona. *Aph. Jour.*, Vol. 10, p. 186.

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Observations of the Second and Third Contacts at the Solar Eclipse of January 22, 1898, in India. *Ast. Jour.*, Vol. 20, p. 144.

On the Probable Error of a Radial Velocity-determination. *Aph. Jour.*, Vol. 11, p. 167.

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Some Spectrographic Results Obtained at the Indian Eclipse by the Lick Observatory-Crocker Expedition. *Aph. Jour.*, Vol. 11, p. 226.

The Temperature Control of the Mills Spectrograph. *Aph. Jour.*, Vol. 11, p. 259.

The Variable Velocity of β Herculis in the Line of Sight. *Aph. Jour.*, Vol. 11, p. 140.

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SAMUEL ALEXANDER CHAMBERS, M.A.,

Instructor in French.

The New Doctorate of the French Universities. *University Magazine*, May, 1899, Vol. 5, p. 175.

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MAY LUCRETIA CHENEY, B.L.,

Appointment Secretary, Secretary for University Extension.

Teaching in California. *Univ. of Cal. Magazine*, October, 1900.

JOSEPH CORBETT CHRISTENSEN, B.S.,

Assistant in Chemistry.

Repairing Beckmann Thermometers. *Jour. Am. Chem. Soc.*, December, 1899, Vol. 31, p. 1175.

The Boiling-points of Mixtures of Chloral and Water. *Jour. Phys. Chem.*, Vol. 4, No. 7, p. 585, October, 1900.

SAMUEL BENEDICT CHRISTY, Ph.B.,

Professor of Mining and Metallurgy and Dean of the Faculty of the College of Mining.

The Solution and Precipitation of Cyanide of Gold. *Trans. Amer. Ins. Min. Eng.*, Vol. 27, pp. 735–772. Reprinted in *Min. and Scientific Press*, San Francisco, and in the *South African Min. Jour.*

The California College of Mines. California Mines and Minerals. *Publ. Cal. Miners' Assoc.*, 1899, pp. 234-254.

The Electromotive Force of Metals in Cyanide Solutions. Read before Amer. Inst. of Mining Engineers, San Francisco, September, 1899. (In press.)

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EDWARD BULL CLAPP, Ph.D.,

Professor of the Greek Language and Literature.

Homer's Iliad, Books XIX–XXIV. Edited on the basis of the Ameri-Hentze edition, with critical and metrical appendices. Ginn & Co., Boston, 1899, 441 pp.

GEORGE ELDEN COLBY, M.S.,

Instructor in the Laboratory of Agricultural Chemistry.

Olives: Varieties and their Adaptation. *U. C. Agr. Exp. Sta. Bull. 123*, January, 1899, p. 13.

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- Investigations of Canned Products [with Dr. Hilgard], p. 6.
- Some Physical and Chemical Properties of Salad Oils, p. 5.
- California Apples, p. 6.
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CHARLES ARTHUR COLMORE, B.S.,

Clerk to the Director of Agricultural Experiment Stations.

Forests in their Relation to Storage Reservoirs. *Rural Californian*, April, 1899, Vol. 22, No. 4, p. 129.

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CLARENCE LINUS CORY, M.M.E.,

Associate Professor of Electrical Engineering.

The Electrical Illumination of San Francisco. (Reception to First California Regiment on its return from Manila.) *Amer. Electrician*, November, 1899, Vol. 11, p. 506.

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Reports of examinations and tests of various electric railway, lighting, and power systems.

RUSSELL TRACY CRAWFORD, B.S.,

Fellow at Lick Observatory.

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GEORGE DAVIDSON, PH.D., SC.D.,

Honorary Professor of Geodesy and Astronomy, and Professor of Geography.

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Report to President Wheeler upon the Collection of the Philadelphia Commercial Museum, its Methods, Administration, etc. *Univ. Chronicle*, 1899, Vol. 2, No. 5. Reprinted, 8vo., 13 pp.

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Discussion upon the Names of the Larger Geographical Features of North America. *Bulletin of the Geog. Soc. of Philadelphia*, November, 1898, Vol. 2, No. 4, pp. 63–64.

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JOSEPH BURTT DAVY,

Assistant in Botany and Assistant Botanist to Agricultural Experiment Stations.

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ARCHIBALD NATHANIEL DICK, M.D.,

Member of Clinical Staff (D.)

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FLETCHER BASCOM DRESSLAR, PH.D.,

Assistant Professor of the Science and Art of Teaching.

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ELMER REGINALD DREW, B.S.,

Instructor in Physics.

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ARTHUR STARR EAKLE, PH.D.,

Assistant in Mineralogy.

Topaz Crystals in the U. S. National Museum. *Proc. U. S. Nat. Museum*, 1898, Vol. 21, p. 361.

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FRANK BLANEY EATON, M.D.,

Associate Professor of Ophthalmology (P.)

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WILLIAM SCOTT FERGUSON, Ph.D.,

Instructor in Grecian and Roman History.

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ROBERT HOWE FLETCHER, Grad. U. S. Nav. Acad.,

Professor of Ancient and Modern History and Art and Curator (H.)

Chinatown, with Illustrations by Ernest Peixotto. A. Robertson, San Francisco.

Editor of the *Mark Hopkins Institute Review of Art*, an illustrated quarterly.

CARROLL FOWLER, B.S.,

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STATISTICAL ADDENDA.

COMPILED BY THE RECORDER OF THE FACULTIES.

TABLE 1.—Statement of instruction and attendance in the courses given in the Academic Colleges, at Berkeley, 1899–1900.

Explanatory Note.—

One hour of lecture or recitation per week during one half-year counts for the student as one unit of credit toward a degree (for which 125 units are necessary); hours in laboratory or field not requiring preparation are estimated in units of credit at a lower rate than recitations or lectures.—In the column giving instructors' hours at the university, it is understood that the appointments were for recitation or lecture, unless the abbreviation (L) is used, in which case the time was given to instruction in the laboratory, or draughting-room, or field. Where the names of two or more instructors, associated in the work of a course, are given together, the appointments given are those of the instructor first named.—In the column showing the number of students enrolled in the several courses, a colon (:) is used to separate the figures wherever it is necessary to exhibit separately the enrollment in any course for the first and for the second half-years respectively.—A short dash (—) in any of the columns giving number of units, hours, or students, indicates that exact numerical statement is impossible.

In addition to the names of officers in charge of classes, in all departments, with their regular class appointments, the Statement includes the names of department assistants who had no regular class appointments.

Instructor, and Course	Units of Credit	No. of Hours per week Given to the Course by the Instructor		No. of Students Enroll'd
		First Half-Year	Second Half-Year	
PHILOSOPHY.				
Prof. Howison—Absent on leave, 1899–1900.				
Assoc. Prof. Stratton.				
2. General Psychology (repeated second half-year; first half-year, 1½ sections)	3	4½	3	78:53
6. Introduction to Psychological Experiment	2	....	3	32
13. Psychological Conference	2	....	2	6
14. Psychological Laboratory	3	9L	....	2
15. Psychological Laboratory: Advanced (repeated second half-year)	3	8L	8L	4:6
22. Special Work in Psychological Laboratory	—	—	....	1

Statement of Instruction and Attendance—*(Continued).*

Instructor, and Course	Units	Instructor's Hours		Students
		First Half	Second Half	
Instructor Montague.				
1. Formal Logic (2 sections; repeated second half-year)	3	6	6	27:31
10. Inductive Logic	4	2	2	6
18. Theory of Knowledge	4	2	2	4
5. The Philosophy of Kant	4	2	2	20
Instructor Moore.				
3. History of Philosophy	4	2	2	36
3A. History of Philosophy	2		2	19
1. Formal Logic (repeated second half-year)	3	3	3	16:28
2. General Psychology (repeated second half-year; first half-year, 1½ sections)	3	4½	3	45:40
4. Ethics, including Civil Polity	8	4	4	15
PEDAGOGY.				
Prof. Brown.				
5. Theory of Education	3	3		68
6. School Systems	2		2	58
7A. Seminary for Study of Special Problems in Education	2	2		16
7B. Seminary for Study of Special Problems in Education	2		2	10
13A. Studies in Secondary Education	3		3	34
13C. Visitation of Secondary Schools	1	3L		3
Assoc. Prof. Bailey.				
3. Ancient Ideals of Character and its Culture	3		3	11
4. Modern Ideals of Character and its Culture	3	3		18
8. Seminary for the Study of Character Types (repeated second half-year)	2	2	2	7:10
14. Introduction to Ethology	3	3		79
15. Special Work in Ethology	—	—	—	4:11
Asst. Prof. Dresslar.				
10A. Introduction to Pedagogy	3	3		107
11A. Seminary for the Study of Children	2	2		6
11B. Seminary for the Study of Children	2		2	4
12. School Hygiene	2		2	159
Asst. Prof. Dresslar and Asst. Heaton.				
1. The Practice of Teaching	4 or 5		3	45
1A. Practice Course	3 or 4	2		11
Supervision of student-teachers in schools		8½L	6L	
Asst. Heaton.				
1. The Practice of Teaching	4 or 5		3	45
1A. Practice Course	3 or 4	2		11
Supervision of student-teachers in schools		15L	25L	
Honorary Fellow Hackley.				

Statement of Instruction and Attendance—*(Continued).*

Instructor, and Course	Units	Instructor's Hours		Students
		First Half	Second Half	
JURISPRUDENCE.				
Prof. Jones.				
11. History of the Common Law	6	3	3	30
5. Roman Law	3	3	....	42
8. The Law of Contracts	3	....	3	31
1. The Formation of Federal Constitution (repeated second half-year)	1	1	1	10:19
2. Constitutional Law of the United States	6	3	3	13
Honorary Prof. Lindley—Absent on leave, 1899-1900.				
Asst. Prof. Hengstler.				
10. Elementary Law and Jurisprudence	4	2	2	63
12. The Law of Torts	4	2	2	42
13. The Law of Crimes	4	2	2	49
3. Principles of International Law	2	2	....	29
Honorary Instructor Gorrill (second half-year.)				
15. Cases on Contracts	2	....	2	32
HISTORY AND POLITICAL SCIENCE.				
Prof. Moses.				
23. Territorial Expansion of the United States	2	2	....	18
9. Spanish-American History and Institutions	2	....	2	35
15. Economic Theory	4	....	4	9
16. History of Political Theories	4	4	....	21
17. Political Science	2	....	2	15
18. Theories of Social Progress	2	2	....	5
47. Spanish Constitutional History	2	....	2	1
Prof. Moses (occasional lectures), and Assoc. Prof. Plehn, Asst. Profs. Babcock and Page.				
1a. Introduction to History and Economics (repeated second half-year)	4	—	—	169:95
Prof. Bacon.				
2b. History of England	4	4	....	60
3a. The French Revolution	4	4	....	80
4. Europe in the Nineteenth Century	4	....	4	52
10a. The Renaissance and Reformation	4	....	4	23
42. History of Eastern Christendom	4	2	2	6
46. The Renaissance	4	....	4	1
Assoc. Prof. Plehn.		....		
7. Economics	4	4	....	63
16a. Banking and Currency	2	2	....	17
14. Public Finance	4	....	4	29
22. Statistics	2	2	....	8
28. Currency and Banking	4	2	2	1
Assoc. Prof. Plehn, with Prof. Moses.				
1a. Introduction to History and Economics	4	....	4	95

STATEMENT OF INSTRUCTION AND ATTENDANCE—*(Continued)*.

INSTRUCTOR, AND COURSE	UNITS	INSTRUCTOR'S HOURS First Half	INSTRUCTOR'S HOURS Second Half	STUDENTS
Asst. Prof. BABCOCK.				
9B. Mediæval Life and Institutions	4	....	4	54
5. The English Colonies in America	4	4	....	31
6B. The United States since 1850	4	....	4	52
29. Investigation Course in the History of the United States	4	2	2	3
Asst. Prof. BABCOCK, with Prof. MOSES.				
1A. Introduction to History and Economics	4	4	....	87
Asst. Prof. PAGE.				
2B. History of England	4	....	4	150
8A. Economic History of the United States	4	....	4	34
12A. Economic History to 1763	4	4	....	8
Asst. Prof. PAGE, with Prof. MOSES.				
1A. Introduction to History and Economics	4	4	....	82
President WHEELER.				
45. Greek Institutions	2	....	2	84
SEMITIC LANGUAGES AND LITERATURES.				
Prof. VOORSANGER.				
7. Biblical Hebrew—Exegetical Course	4	2	2	2
7A. Biblical Archæology	4	2	2	12
8. Rabbinical Hebrew—The Mishna	1	1	....	2
9. Selected Readings from the Jewish Exegetical Writings of the Middle Ages	1	....	1	2
Assoc. Prof. MARGOLIS.				
2. Comparative Grammar of the Semitic Languages	2	1	1	2
3. Biblical Hebrew—Elementary Course	10	5	5	2
4. Biblical Hebrew—Second Course	6	3	3	1
6A. History of the Text of the Old Testament	2	1	1	1
6B. Biblical Hebrew—Exegetical Course	4	2	2	1
11. Aramaic and Syriac—Advanced Course	4	2	2	1
13. Arabic—Introductory Course	4	2	2	2
15. Arabic—Third Course	4	2	2	3
20. The Septuagint [also announced as *Greek 35*]	4	2	2	3
ORIENTAL LANGUAGES AND LITERATURES.				
Prof. FRYER.				
1. The Languages, Literatures, History, Government, and Social Condition of China and Japan	4	2	2	32
1A. The Commerce of China and Japan with Europe and America	4	2	2	20
4. Advanced Study of Kuan-hua	6	3	3	2
5. Elementary Study of Wen-li	6	3	3	1
Mr. GARDINER.				
7. Elementary Study of the Cantonese Dialect	6	3	3	4

STATEMENT OF INSTRUCTION AND ATTENDANCE—*(Continued).*

INSTRUCTOR, AND COURSE	UNITS	INSTRUCTOR'S HOURS		STUDENTS
		First Half	Second Half	
GREEK.				
Prof. CLAPP.				
2. Herodotus and Plato's Apology	3		3	39
7A. Introduction to Greek Tragedy	3	3		38
25. The Gorgias of Plato	2	2		24
24. The Seventh Book of Thucydides	2		2	27
53. Aeschylus	8	4	4	7
Assoc. Prof. FLAGG. (See also *Latin.*)				
1. Twelve Books of Homer	3	3		13
4A. Exercises in Writing Greek at Hearing, and in Prose Composition	1	1		15
6B. Greek Composition	1		1	10
8A. The Heraclidae of Euripides, and the Clouds of Aristophanes	3		3	11
16A. Studies in Greek Literature	2	1	1	12
32. Selections from the Attic Orators	2	2		16
20. The Hippolytus, Iphigenia at Aulis and Iphigenia among the Taurians of Euripides	2		2	11
34. Comparative Syntax and Idiom of Greek and Latin. [Also announced as *Latin 27.*]	2	1	1	5
Assoc. Prof. MARGOLIS.				
35. (See *Semitic 20.*)				
Instructor ALLEN.				
1A. Homer's Iliad—Books xix–xxiv (2 sections)	3	6		79
2. Herodotus and Plato's Apology (2 sections)	3		6	51
3B. Exercises in Greek Grammar and Syntax	1	1		17
9A. Selected Orations of Lysias, and the Panegyric of Isocrates	3		3	23
22. The Agamemnon of Aeschylus	2	2		12
41. Introduction to Greek and Roman Sculpture and Architecture	4	2	2	26
42. The Acropolis of Athens	1		1	23
Assistant NOON. (See also *Latin.*)				
LATIN.				
Prof. MERRILL.				
10. Horace, Satires and Epistles	2		2	33
19. Patristic Latin	3	3		44
24. Early Latin	3		3	46
49. Sight Translation	1	3		17
33. Cicero, De Finibus	3	3		9
34. Latin Seminary	6	3	3	6
37. Catullus	3		3	7
Assoc. Prof. FLAGG. (See also *Greek.*)				
5. Horace and Virgil	3	3		27
27. Greek and Latin Composition. (See *Greek 34.*)				

Statement of Instruction and Attendance—(*Continued*).

Instructor, and Course	Units	Instructor's Hours		Students
		First Half	Second Half	
Asst. Prof. Richardson.				
5. Horace and Virgil	3	3		33
8. Cicero, Letters; Roman Literature	2		2	40
12. Latin Composition, III	2	1	1	24
13. Latin Composition, IV	2	1	1	2
14F. Lucan	1		1	5
16. Ovid; Propertius	3	3		47
17. Virgil's Georgics; Seneca's Medea	2		2	47
29. Roman Oratory	3	3		30
35. Teachers' Training Course	3		3	19
30. Latin Verse Composition	2	1	1	2
47. Metric	2	1	1	2
Instructor Price.				
1. Cicero and Pliny (2 sections)	3	6		59
1B. Sight Translation	1	1	1	50
2. Livy and Plautus (2 sections)	3		6	55
4. Latin Composition, II (3 sections)	2	3	3	107
5. Horace and Virgil	3	3		33
41. Palæography and Text Criticism	1	1		4
50. Horace, Satires and Epistles	2		2	52
Instructor Nutting.				
1. Cicero and Pliny (repeated second half-year; 2 sections first half-year)	3	6	3	47:22
2. Livy and Plautus (repeated second half-year; 2 sections second half-year.)	3	3	6	14:35
5. Horace and Virgil	3	3		27
7. Tacitus; Ovid	2		2	35
40A. Latin Grammar: Forms	2	2		12
40B. Latin Grammar: Syntax	2		2	10
Instructor Hopkins.				
1. Cicero and Pliny (2 sections)	3	6		62
2. Livy and Plautus (2 sections)	3		6	50
3. Latin Composition, I (4 sections)	2	4	4	139
31A. Roman Satire	2	2		50
31B. Roman Satire	2		2	51
Reader Alexander.				
Assistant Noon. (See also *Greek*.)				
ENGLISH.				
Prof. Gayley.				
7C. Oral Debates upon Literary Topics	2 or 4	2	2	14:11
9A. Literary Criticism	2	2		76
9B. Literary Criticism	3		3	23
17A. Shakespeare	2		2	112
21B. Poets of the Nineteenth Century	3	3		24
30. The History of Aesthetic	4 or 6	2	2	9
31. English Comedy	4 or 6	—	—	2
33. Special Study	—		—	1

STATEMENT OF INSTRUCTION AND ATTENDANCE—*(Continued).*

INSTRUCTOR, AND COURSE	UNITS	INSTRUCTOR'S HOURS		STUDENTS
		First Half	Second Half	
Prof. BRADLEY (first half-year).				
14. English Grammar	3	3		6
18A. Milton	2	2		29
27. The Mediæval Spirit in Literature and Art	2	2		10
28. The Essay	2	2		4
Assoc. Prof. LANGE.				
6. Interpretation: Logical and Literary	3		3	41
5. Old English	3	3		61
8. Poetics (repeated second half-year)	2	2	2	60:55
12A. Beowulf	3		3	24
13. Chaucer	3	3		15
26. The Influence of Germany on English Literature of the Eighteenth and Nineteenth Centuries	4	2	2	4
34. Seminar in Method	2		2	14
33. Special Study	—	—	—	1
Assoc. Prof. SYLE.				
1. General History of English Literature (2 sections)	6	6	6	86
3A. Composition: Scientific Exposition	2	2		80
3B. Composition: Scientific Exposition	2		2	68
19A. English Literature of the Eighteenth Century	3	3		12
19B. English Literature of the Eighteenth Century	3		3	24
Asst. Prof. ARMES.				
2. General History of English Literature (3 sections)	6	9	9	115
22A. The History of American Literature	3	3		14
22B. American Authors	3		3	92
Asst. Prof. SANFORD.				
1. General History of English Literature	6	3	3	46
1A. General History of English Literature	6	*3	*3	24:74
2. General History of English Literature	6	3	3	37
15A. Typical Forms of Verse in the Age of Elizabeth	2		2	28
15B. The Faerie Queene of Spenser	3	3		30
Instructor HART.				
1. General History of English Literature (2 sections)	6	6	6	79
4A. Short Course in the History of English Literature—Beowulf to Milton	2	2		62
4B. Short Course in the History of English Literature—Milton to Tennyson	2		2	47
10. Composition under Individual Training and Direction	2		2	6
11. The Composition of the Short Story	2	2		8
5. Old English	3	3		53

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* Course begins second half-year.

Statement of Instruction and Attendance—*(Continued).*

Instructor, and Course	Units	Instructor's Hours		Students
		First Half	Second Half	
Instructor Flaherty.				
1. General History of English Literature (3 sections)	6	9	9	141
7A. Argumentation	3	3	....	48
7B. Forensics	3	....	3	22
Honorary Fellow Winter.				
GERMAN.				
Prof. Putzker—Absent on leave, 1899–1900.				
Assoc. Prof. Senger.				
3. Scientific German	6	3	3	28
4. Goethe	6	3	3	59
5. Lessing	6	3	3	31
7. Middle High German	3	3	....	12
8. Gothic	3	....	3	9
12. Historical German Grammar	4	2	2	4
9. Goethe's Faust	2	....	2	10
16. Special Study	—	....	—	4
Instructor Wharff.				
1. Introductory German (2 sections)	8	8	8	138
2. Schiller	8	4	4	65
13. Difficult Prose	6	3	3	5
Assistant Centner.				
1. Introductory German	8	4	4	72
1A. German Prose	8	4	4	16
2. Schiller	8	4	4	65
6. Higher Composition	4	2	2	9
Reader Ongerth.				
ROMANIC LANGUAGES.				
Prof. Paget.				
12A. Eighteenth Century Literature	1	1	....	24
12B. Eighteenth Century Drama	1	....	1	27
16A. The Realistic School—Prose	1	1	....	8
16B. The Realistic School—Drama	1	....	1	6
13D. Victor Hugo's Prose (2 sections)	2	4	....	88
13E. Victor Hugo's Prose (2 sections)	2	....	4	67
26. Romance Philology	4	1	1	4
28. Seminary	3 to 8	1½	1½	5
29. Special Study	—	....	—	1
Prof. Paget, and Instructor Howard, Assistant Bartlett, and Hon. Fellow Hus.				
4. French Drama	6	2	2	53
Prof. Paget and Instructor Howard.				
19C. Classic Spanish	6	2	2	7

STATEMENT OF INSTRUCTION AND ATTENDANCE—*(Continued).*

INSTRUCTOR, AND COURSE	UNITS	INSTRUCTOR'S HOURS		STUDENTS
		First Half	Second Half	
Prof. PAGET and Instructor CHAMBERS.				
24. Dante's La Divina Commedia	6	2	2	4
Instructor HOWARD.				
5. French Idioms and Synonyms	2	1	1	13
5A. French Writing and Speaking	4	2	2	17
18. Introductory Spanish	6	3	3	40
Instructor HOWARD, Assistant BARTLETT, and Hon. Fellow HUS.				
1. Introductory Course (4 sections)	8	4	4	185
Instructor HOWARD, with Prof. PAGET, Asst. BARTLETT, and Hon. Fellow HUS.				
4. French Drama	6	2	2	53
Instructor HOWARD and Instructor FAUCHEUX.				
19B. Modern Spanish	6	1	1	25
Instructor HOWARD, with Prof. PAGET.				
19C. Classic Spanish	6	1	1	7
Instructor FAUCHEUX.				
2A. Scientific French Prose	6	3	3	17
5A. French Writing and Speaking	4	2	2	15
6. The Romantic Poets	4	2	2	17
10A. The Seventeenth Century—Prose	2	2	....	9
10B. The Seventeenth Century—Poetry	2	....	2	8
14B. Victor Hugo's Poetry	2	2	....	15
14C. Victor Hugo's Poetry	2	....	2	33
25. Old French	4	2	2	6
Instructor FAUCHEUX, with Instructor HOWARD.				
19B. Modern Spanish	6	2	2	25
Instructor CHAMBERS.				
2B. General French Prose	6	3	3	25
7. History of French Literature	4	2	2	6
9A. The Sixteenth Century—Prose	1	1	....	4
9B. The Sixteenth Century—Poetry	1	....	1	4
12C. Eighteenth Century Readings	2	2	....	10
12D. Readings in Eighteenth Century Drama	2	....	2	12
11C. Recent Novelists	2	2	....	7
11D. Living Writers	2	....	2	6
21. Introductory Italian	6	3	3	6
Instructor CHAMBERS, with Prof. PAGET.				
24. Dante's La Divina Commedia	6	1	1	4
Assistant BARTLETT, with Instructor HOWARD, and Hon. Fellow HUS.				
1. Introductory Course (4 sections first half-year; 3 sections second half-year)	8	12	9	185: 140

STATEMENT OF INSTRUCTION AND ATTENDANCE—*(Continued)*.

INSTRUCTOR, AND COURSE	UNITS	INSTRUCTOR'S HOURS		STUDENTS
		First Half	Second Half	
Assistant BARTLETT, with Prof. PAGET, Instructor HOWARD, and Hon. Fellow HUS.				
4. French Drama (2 sections)	6	2	2	53
Hon. Fellow HUS (second half-year), with Prof. PAGET, Instr. HOWARD, and Asst. BARTLETT.				
1. Introductory Course	8		3	45
4. French Drama (2 sections)	6	2	2	53
DECORATIVE AND INDUSTRIAL ART.				
Assoc. Prof. ARDLEY.				
3. Cast Drawing	4	6L	6L	3
4. Advanced Drawing	4	6L	6L	5
5. Antique Drawing	4	6L	6L	1
6. History of Art	2	1	1	44
11. Applied Art	8	6L	6L	12
12. Applied Art (advanced)	8	6L	6L	2
13. Wood Carving	4	6L	6L	3
16. Art Furniture	4	6L	6L	2
17. Interior Decoration	4	6L	6L	3
21. Historic Design	2		6L	1
Assoc. Prof. ARDLEY and Instructor WINTERBURN.				
7. Geometric Design	4	6L		24
8. Plant Analysis	2	6L		22
9. Historic Ornament	2		6L	16
10. Ornamental Design	4		6L	16
Instructor YELLAND—Absent on leave, 1899–1900.				
Instructor WINTERBURN.				
1. Elementary Drawing (3 sections)	2	9L	9L	91
2. Object Drawing	4	6L	6L	27
Instructor WINTERBURN, with Assoc. Prof. ARDLEY.				
7. Geometric Design	4	6L		24
8. Plant Analysis	2	6L		22
9. Historic Ornament	2		6L	16
10. Ornamental Design	4		6L	16
MATHEMATICS.				
Prof. STRINGHAM—Absent on leave, 1899–1900.				
Assoc. Prof. EDWARDS.				
2. Elements of Analysis	6	3	3	85
3A. Elements of Analysis, with Applications	10	5	5	39
3B. Elements of Analysis, with Applications. Second Course	6	3	3	45
19A. Differential Equations	3	3		28
19B. Differential Equations	3		3	2

Statement of Instruction and Attendance—*(Continued).*

Instructor, and Course	Units	Instructor's Hours		Students
		First Half	Second Half	
Assoc. Prof. Haskell.				
3B. Elements of Analysis, with Applications. Second Course (first half-year only—second half: Instructor Whitney)	3	3		26
7. Spherical Trigonometry	1		1	11
8. Projective Geometry	1	1		14
20. Selected Topics in Higher Mathematics	4	2	2	19
29. Spherical Harmonics	2		2	6
30. Theory of Algebraic Forms	6	3	3	3
34. Mathematical Seminary	—	2	2	4
Instructor Pierce.				
1A. Algebra	2		2	32
1C. Algebra	2	2		20
3A. Elements of Analysis, with Applications	10	5	5	25
3B. Elements of Analysis, with Applications. Second Course	6	3	3	34
15. Analytical Projective Geometry	6	3	3	14
Instructor Noble.				
1A. Algebra (3 sections)	2	6		86
1C. Algebra	2		2	32
5. Plane Analytic Geometry (repeated second half-year)	3	3	3	30:29
6. Solid and Spherical Geometry	2		2	42
9. Differential and Integral Calculus	6	3	3	27
10. Problems in the Differential and Integral Calculus	2		2	19
Instructor Wilczynski.				
1A. Algebra	2	2		37
3A. Elements of Analysis, with Applications	10	5	5	54
6. Solid and Spherical Geometry	2	2		44
9B. Differential and Integral Calculus	6	3*	3*	20:39
10. Problems in the Differential and Integral Calculus	2		2	28
36. The Hypergeometric Functions	4	2	2	3
38. Calculus of Variations	1		1	5
Instructor Whitney.				
1A. Algebra (2 sections)	2	4		82
1C. Algebra	2		2	49
3B. Elements of Analysis, with Applications. Second Course (second half-year only—first half: Assoc. Prof. Haskell)	3		3	28
4. Plane and Spherical Trigonometry (repeated second half-year)	3	3	3	40:53
5. Plane Analytic Geometry	3	3		36
6. Solid and Spherical Geometry (repeated second half-year)	2	2	2	41:58
24. Theory of Functions of a Complex Variable	3		3	4

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* Course begins second half-year.

STATEMENT OF INSTRUCTION AND ATTENDANCE—*(Continued)*.

INSTRUCTOR, AND COURSE	UNITS	INSTRUCTOR'S HOURS		STUDENTS
		First Half	Second Half	
Instructor PERRY.				
1A. Algebra (repeated second half-year; 2 sections first half-year)	2	4	2	58:43
4. Plane and Spherical Trigonometry (repeated second half-year)	3	3	3	39:35
5. Plane Analytic Geometry (repeated second half-year)	3	3	3	24:15
6. Solid and Spherical Geometry	2	....	2	20
11. Determinants and Theory of Equations	4	2	2	13
Assistant HATHAWAY.				
3A. Elements of Analysis, with Applications	10	5	5	53
6. Solid and Spherical Geometry (repeated second half-year)	2	2	2	17:37
PHYSICS.				
Prof. SLATE.				
15. Dynamics of Rotation	4	2	2	2
16. Special Advanced Study and Research	—	—	—	2
17. Readings and Discussions	4	2	2	2
18. Special Undergraduate Study	—	—	—	7
Prof. SLATE and Asst. Prof. RAYMOND.				
5. Analytic Mechanics (2 sections). [Also announced as *Mechanics 1.*]	8	4	4	83
Asst. Prof. RAYMOND.				
6. Harmonic Motion	2	—	2	2
7. Absolute Electrical Measurements	3	—	1, 6L	18
10. Electricity	2	2	....	30
13. Physical Optics	2	6L	....	1
14. Advanced Physical Measurement	3	6L	....	2
18. Special Undergraduate Study	—	—	—	5:4
Asst. Prof. RAYMOND, with Prof. SLATE.				
5. Analytic Mechanics (2 sections)	8	4	4	83
Asst. Prof. LEWIS—Absent on leave, 1899–1900.				
Instructor DREW.				
2A. General Physics	6	3	3	118
3. Physical Measurement	4	6L	6L	38
8. Theory of Light	4	2	2	5
18. Special Undergraduate Study	—	—	—	2
Instructor DREW (lectures) and Instructor ALEXANDER (laboratory)				
1. Elementary Physics (3 sections)	6	3	3	252
Instructor BOYNTON.				
2A. General Physics	6	3	3	49
3. Physical Measurement (2 sections)	4	12L	12L	100
9A. Molecular Physics	2	—	2	11
12. Heat as a Form of Energy	2	2	....	15

STATEMENT OF INSTRUCTION AND ATTENDANCE—*(Continued)*.

INSTRUCTOR, AND COURSE	UNITS	INSTRUCTOR'S HOURS		STUDENTS
		First Half	Second Half	
Instructor ALEXANDER (laboratory) and Instructor DREW (lectures)				
1. Elementary Physics (4 sections)	6	24L	24L	252
Assistants INCELL, GRAY (first half-year), HALL, NUTTING, SKILLING (second half-year).				
ASTRONOMY.				
Assoc. Prof. LEUSCHNER.				
6. Theoretical Astronomy	8	4	4	4
13. Perturbations	8	4	4	3
Assoc. Prof. LEUSCHNER, the Director and Astronomers of the Lick Observatory, and Honorary Lecturer MCADIE.				
1. Modern Astronomy	4	2	2	87
Honorary Lecturer MCADIE, with Assoc. Prof. LEUSCHNER and the Director and Astronomers of the Lick Observatory.				
1. Modern Astronomy. Four lectures	4	....	....	87
Instructor TOWNLEY.				
3. General Astronomy	3	3	....	4
7. Method of Least Squares	3	3	....	15
9. Interpolation and the Use of Tables	3	....	3	6
11. Advanced Practical Astronomy	2	1	1	4
14. Advanced Practical Astronomy	2	3	3	4
15. Advanced Study and Research	—	—	—	1
Instructor TOWNLEY, Assistant FREY (first half-year), and Assistant HOBE (second half-year.)				
2. Supplement to Course 1	4	6L	6L	17
4A. Practical Astronomy	7	6L	3, 6L	1
4B. Practical Astronomy	4	2, 3L	3L	3
Student Assistant FREY (first half-year), with Instructor TOWNLEY. (See also *Civil Engineering*.)				
2. Supplement to Course 1	4	6L	....	17
4A. Practical Astronomy	7	6L	....	1
4B. Practical Astronomy	4	2, 3L	....	3
Student Assistant HOBE (second half-year), with Instructor TOWNLEY.				
2. Supplement to Course 1	4	....	6L	17
4A. Practical Astronomy	7	....	3, 6L	1
4B. Practical Astronomy	4	....	3L	3
Student Assistant KUNO.				

STATEMENT OF INSTRUCTION AND ATTENDANCE—*(Continued).*

INSTRUCTOR, AND COURSE	UNITS	INSTRUCTOR'S HOURS		STUDENTS
		First Half	Second Half	
GEOGRAPHY.				
Prof. DAVIDSON.				
1 and 2 The Currents and Climatology of the Pacific Ocean	3	3		19
The Physical Features and Resources of the Countries contiguous thereto	3		3	16
CHEMISTRY.				
Prof. RISING.				
1. General Inorganic Chemistry—Non-Metals (2 sections)	3	6		302
2. General Inorganic Chemistry—Metals (2 sections)	3		6	278
7A. Inorganic Chemistry	4	2	2	25
11. Theoretical Chemistry	2		2	21
23. Thermo-chemistry	2	2		3
25. Explosives	2		2	35
28. Teachers' Course (repeated second half-year)	2	2, 6L	2, 6L	19:17
30. Special Undergraduate Study and Research	—	—		2
31. Graduate Course	—	—	—	2
Prof. RISING and Honorary Fellow MYERS.				
7B. Inorganic Chemistry: Laboratory	—	—	—	2
Assoc. Prof. O'NEILL.				
8. Organic Chemistry (repeated second half-year)	2	2	2	12:45
9. Organic Chemistry	3	3		17
20. Toxicology	2	2		18
27. History of Chemistry	1		1	9
30. Special Undergraduate Study and Research	—	—	—	1:6
Assoc. Prof. O'NEILL and Instructor GRAY.				
5. Laboratory: Quantitative Analysis—Gravimetric	3	9L		22
Assoc. Prof. O'NEILL and Instructor BLASDALE.				
21. Water Analysis	2		6L	7
Instructor BLASDALE.				
16. Ore Analysis	2	6L		5
30. Special Undergraduate Study and Research	—	—	—	4:3
Instructor BLASDALE and Assistant CHRISTENSEN.				
5. Laboratory: Quantitative Analysis—Gravimetric	3	9L		67
6. Laboratory: Quantitative Analysis—Volumetric	3		9L	72
Instructor BLASDALE, with Assoc. Prof. O'NEILL.				
21. Water Analysis	2		6L	7

Statement of Instruction and Attendance—*(Continued).*

Instructor, and Course	Units	Instructor's Hours		Students
		First Half	Second Half	
Instructor Gray.				
10. Laboratory: Organic (repeated second half-year)	3	9L	9L	11:9
10B. Laboratory: Organic (repeated second half-year)	5	15L	15L	2:5
30. Special Undergraduate Study and Research	—	—	....	1
Instructor Gray, with Assoc. Prof. O'Neill.				
5. Laboratory: Quantitative Analysis—Gravimetric	3	9L	....	22
Instructor Booth.				
17A. Chemistry of Structural Materials	1	....	1	—
26. Rare Metals	1	....	1	10
30. Special Undergraduate Study and Research	—	....	—	13
Instructor Booth, and Assistants Aplin and Collins.				
3. Laboratory: Experiments (4 sections)	2	24L	....	203
4. Laboratory: Qualitative Analysis (3 sections)	2	....	18L	215
Assistant Aplin (first half-year), with Instructor Booth and Assistant Collins.				
3. Laboratory: Experiments (4 sections)	2	24L	....	203
4. Laboratory: Qualitative Analysis (3 sections)	2	....	18L	215
Assistant Collins, with Instructor Booth, and Assistant Aplin.				
3. Laboratory: Experiments (4 sections)	2	24L	....	203
4. Laboratory: Qualitative Analysis (3 sections)	2	....	18L	215
Assistant Christensen, with Instructor Blasdale.				
5. Laboratory: Quantitative Analysis—Gravimetric	3	9L	....	67
6. Laboratory: Quantitative Analysis—Volumetric	3	....	9L	72
Reader Beattie.				
15. Electrolysis (repeated second half-year)	2	6L	6L	4:6
30. Special Undergraduate Study and Research	—	....	—	2
Honorary Fellow Myers (second half-year), with Prof. Rising.				
7B. Inorganic Chemistry: Laboratory	—	—	—	2
Assistants Pearce, Allen, Cuttle, Laist.				
BOTANY.				
Prof. Setchell.				
1. Fundamentals of Botany	3	3	....	176
6. Phycology and Mycology	6	6L	6L	1
14. Advanced Cryptogamic Botany	—	—	—	3
Prof. Setchell and Assistant Nott.				
5. General Cryptogamic Botany	6	1	1	12

Statement of Instruction and Attendance—*(Continued)*.

Instructor, and Course	Units	Instructor's Hours		Students
		First Half	Second Half	
Prof. Setchell, Asst. Prof. Jepson, and Instructor Osterhout.				
17. Botanical Seminary	—	½	½	3
Asst. Prof. Jepson.				
3. General Phænogamic Botany	3	6L		18
4. Apetalae and Endogens	3		1, 6L	12
13. Taxonomy and Phylogeny of the Phænogams	2	6L		2
15. Advanced Phænogamic Botany	—	—	—	1
Asst. Prof. Jepson and Assistant Nott.				
2. General Plant Morphology (2 sections)	3		6L	123
Asst. Prof. Jepson, with Prof. Setchell, and Instructor Osterhout.				
17. Botanical Seminary	—	½	½	3
Instructor Osterhout.				
2A. Vegetable Physiology	3		3	81
9. Vegetable Histology	6	6L	6L	9
11. Vegetable Cytology	6	6L	6L	2
16. Advanced Histology and Cytology	—	—	—	1
Instructor Osterhout, with Prof. Setchell, and Asst. Prof. Jepson.				
17. Botanical Seminary	—	½	½	3
Assistant Davy.				
8B. Forage Plants (Agrostology)	2	3		2
Assistant Nott, with Prof. Setchell.				
5. General Cryptogamic Botany	6	6L	6L	12
Assistant Nott, with Asst. Prof. Jepson.				
2. General Plant Morphology (2 sections)	3		6L	123
ZOOLOGY.				
Prof. LeConte. (See also *Geology*.)				
14. Physiological Optics	2	2		4
16. Evolution	2		2	46
Assoc. Prof. Ritter.				
1A. The Fundamentals of Zoölogy	4	2	2	93
9. Some Problems of Growth, Differentiation, and Reproduction	1		1	3
10. Research Work	—	4L	3L	5
17. Advanced General Zoölogy	3		3	12
Assoc. Prof. Ritter and Asst. Prof. Merriam. (See also Course 11 under *Geology*.)				
4. Structure and Affinities of the Mammalia	4	8L		20
Assoc. Prof. Ritter and Asst. Prof. Johnson.				
12. Zoölogical Seminary	1	1		6

STATEMENT OF INSTRUCTION AND ATTENDANCE—(*Continued*).

INSTRUCTOR, AND COURSE	UNITS	INSTRUCTOR'S HOURS		STUDENTS
		First Half	Second Half	
Asst. Prof. JOHNSON.				
5. Microscopical Anatomy	5	9L		19
6. Embryology	5		9L	18
7. Introduction to Systematic and Field Zoölogy	6	1, 6L	1, 6L	2
10. Research Work	—	—	—	1
Asst. Prof. JOHNSON, with Assoc. Prof. RITTER.				
12. Zoölogical Seminary	1	1		6
Instructor TORREY (first half-year).				
1B. General Zoölogical Laboratory	4	6L		45
Instructor BANCROFT (second half-year).				
1B. General Zoölogical Laboratory	4		6L	45
5A. General Physiology	3		3	15
GEOLOGY.				
Prof. LECONTE. (See also *Zoölogy*.)				
12. Mountain Building and the Genesis of Metalliferous Veins	2		2	5
15. Quarternary Geology	2	2		6
Prof. LAWSON. (See also *Mineralogy*.)				
1A. General Geology: Dynamical and Structural	3	3		103
2. Field Geology	3	1	2	27
3. Petrography	2	1	1	26
10. Inorganic Geology	—	2	2	3
Prof. LAWSON and Assistant CALKINS.				
4. Petrographical Laboratory (2 sections)	3		12L	29
Asst. Prof. MERRIAM.				
1B. General Geology: Historical	2		2	22
5. General Palaeontology	2	2		54
5A. Palaeontological Laboratory	2	4L		6
6A. Practical Work in Palaeontologic Geology	2		4L	4
11. Vertebrate Palaeontology. (See also *Zoölogy 4*.)	3	3		7
Assistant LOUDERBACK (first half-year).				
4. Petrographical Laboratory (2 sections)	3	6L		29
Assistant CALKINS (second half-year), with Prof. LAWSON.				
4. Petrographical Laboratory (2 sections)	3		12L	29
MINERALOGY.				
Prof. LAWSON. (See also *Geology*.)				
2A. Crystallography	2	2		30
2B. Crystallographic Laboratory	1	2L		17
2C. Physical Properties of Minerals	1		1	27
3. Descriptive Mineralogy	2		2	53
5. Graduate Course	—	—	—	1

Statement of Instruction and Attendance—(*Continued*).

Instructor, and Course	Units	Instructor's Hours		Students
		First Half	Second Half	
Assistant Smith.				
1. Mineralogical Laboratory (3 sections)	4	18L	18L	81
MECHANICAL ENGINEERING.				
Prof. Hesse and Assistant DeLisle.				
2. Hydrodynamics	3	3		50
3. Hydraulics and Hydraulic Machinery	3		3	16
5A. Thermodynamics	3	3		17
5B. Dynamics of Heat Engines	3		3	16
7. Mechanical Laboratory: Experimental Engineering	4	6L	6L	1
Prof. Slate. (See *Physics 5.*)				
Assoc. Prof. Cory.				
10A. Electrical Machinery and Construction	4	2	2	25
11A. Electrical Engineering	4	4		15
11B. Electrical Engineéring	4		4	15
12A. Seminary	4	2	2	6
12B. Laboratory: Electrical Engineering	6	9L	9L	2
Assoc. Prof. Cory and Assistant Lynn.				
10B. Electrical Machinery and Const'n (2 sections)	1		6L	20
11C. Electrical Engineering (2 sections)	6	15L	15L	15
Instructor LeConte. (See also *Drawing and Engineering Design.*)				
4A. Kinematics	4	2	2	16
4B. Kinematics	1		3L	15
Instructor Chesebrough and Assistant Cox.				
8A. Mechanical Practice (2 sections)	2	12L		52
8B. Mechanical Practice (3 sections)	2		18L	37
9A. Mechanical Practice (2 sections)	2	12L		18
9B. Mechanical Practice (2 sections)	2		12L	2
Assistant Cox, with Instructor Chesebrough.				
8A. Mechanical Practice (2 sections)	2	12L		52
8B. Mechanical Practice (3 sections)	2		18L	37
9A. Mechanical Practice (2 sections)	2	12L		18
9B. Mechanical Practice (2 sections)	2		12L	2
Assistant Lynn, with Assoc. Prof. Cory.				
10B. Electrical Machinery and Const'n (2 sections)	1		6L	20
11C. Electrical Engineering (2 sections)	6	15L	15L	15
Assistant DeLisle, with Prof. Hesse.				
2. Hydrodynamics	3	3		50
3. Hydraulics and Hydraulic Machinery	3		3	16
5A. Thermodynamics	3	3		17
5B. Dynamics of Heat Engines	3		3	16
7. Mechanical Laboratory: Experimental Engineering	4	6L	6L	1

STATEMENT OF INSTRUCTION AND ATTENDANCE—*(Continued)*.

INSTRUCTOR, AND COURSE	UNITS	INSTRUCTOR'S HOURS		STUDENTS
		First Half	Second Half	
CIVIL ENGINEERING.				
Prof. SOULÉ. (See also *Military Science and Tactics*.)				
8A. Strength of Materials	4	....	4	46
9. Sewer Systems	2	2	....	5
12. Construction of Dams	3	3	....	3
13. Foundation of Structures	2	....	2	4
16. Specifications and Contracts	2	2	1	2
Prof. SOULÉ and Instructor HUNT.				
8B. Civil Engineering Laboratory	1	....	3L	8
8C. Civil Engineering Laboratory	4	6L	6L	4
Asst. Prof. RANDALL.				
2A. Railway, Highway, and Canal Surveying	3	3	....	14
4. Railroad Economics	3	....	3	5
6. Highways and Pavements	2	....	2	5
7A. Framed Structures	3	....	3	8
7C. Structural Design	6	9L	9L	4
Instructor HUNT.				
1A. Surveying (2 sections)	4	4	4	55
5. Higher Surveying	2	....	2	4
8D. Materials of Construction	2	2	....	12
Instructor HUNT and Instructor CHANDLER.				
3. Summer School in Field Practice and Mapping	—	—	—	49
Instructor HUNT, with Prof. SOULÉ.				
8B. Civil Engineering Laboratory	1	....	3L	8
8C. Civil Engineering Laboratory	4	6L	6L	4
Instructor HIRST.*				
Instructor PROUTY (first half-year.)				
1A. Surveying (2 sections)	4	4	....	66
1B. Field Practice (4 sections)	2	12L	....	116
2B. Railroad Field Practice and Mapping	2	6L	....	9
Instructor CHANDLER (second half-year.)				
1A. Surveying (2 sections)	4	....	4	66
1B. Field Practice and Mapping (4 sections)	2	....	12L	116
1C. Topographical Drawing and Lettering	1	....	3L	14
Instructor CHANDLER and Instructor HUNT.				
3. Summer School in Field Practice and Mapping	—	—	—	49
Student Assistant FREY (see also *Astronomy*), Graduate Assistant STUTT (second half-year), and Student Assistant BURCKHALTER.				

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*Died December 23, 1899.

STATEMENT OF INSTRUCTION AND ATTENDANCE—*(Continued)*.

INSTRUCTOR, AND COURSE	UNITS	INSTRUCTOR'S HOURS		STUDENTS
		First Half	Second Half	
MINING AND METALLURGY.				
Prof. CHRISTY.				
1. Lectures on Mining	4	4	....	30
2. Lectures on Mining	4	....	4	30
5. Metallurgy: Structural Metals and Fuels	2	2	....	35
8. Metallurgy of Gold, Silver, and Quicksilver	2	2	....	29
Prof. CHRISTY and Instructor MORLEY.				
3. Mining Laboratory	2	....	6L	34
7A. Assaying (2 sections)	2	12L	....	28
Prof. CHRISTY, Asst. Prof. HERSAM (first half-year), and Instructor MORLEY.				
7B. Assaying (repeated second half-year)	2	6L	6L	31:29
Prof. CHRISTY and Asst. Prof. HERSAM.				
9. Metallurgical Laboratory	2	6L	....	3
10. Metallurgical Laboratory: Mill Work	2	....	6L	28
Asst Prof. HERSAM.				
6. Metallurgy: General	2	2	....	26
11. Metallurgy of Lead and Copper	2	....	2	30
Asst. Prof. HERSAM, with Prof. CHRISTY, and Instrucor MORLEY.				
7B. Assaying	2	6L	....	31
Asst. Prof. HERSAM, with Prof. CHRISTY.				
9. Metallurgical Laboratory	2	6L	....	3
10. Metallurgical Laboratory: Mill Work	2	....	6L	28
Instructor MORLEY, with Prof. CHRISTY.				
3. Mining Laboratory	2	....	6L	34
7A. Assaying	2	6L	....	28
Instructor MORLEY, with Prof. CHRISTY, and Asst. Prof. HERSAM.				
7B. Assaying (repeated second half-year)	2	6L	6L	31:29
Analytical Assistant YOUNG.				
DRAWING AND ENGINEERING DESIGN.				
Asst. Prof. KOWER.				
2A. Descriptive Geometry (3 sections)	2	....	12L	130
2B. Descriptive Geometry (2 sections)	2	12L	....	58
3. Mechanical Drawing	2	....	6L	42
5. Graphostatics (2 sections)	2	4	....	65
6. Sewer Construction	2	....	6L	1
7. Construction	4	6L		1
Instructor LECONTE. (See also *Mechanical Engineering*.)				
4. Mechanical Drawing	2	....	6L	22
Instructor MAYBECK.				
8A. Elements of Structural Drawing	2	2	2	5
13. Architecture	—	—	—	2

STATEMENT OF INSTRUCTION AND ATTENDANCE—*(Continued).*

INSTRUCTOR, AND COURSE	UNITS	INSTRUCTOR'S HOURS		STUDENTS
		First Half	Second Half	
Instructor SAPH.				
1. Instrumental Drawing (3 sections)	2	18L		127
9. Free-hand Lettering and Round Writing	1		3L	10
AGRICULTURE, HORTICULTURE, AND ENTOMOLOGY.				
Prof. HILGARD and Asst. Prof. LOUGHRIDGE.				
1A. General Course	3	—		10
1B. Chemistry and Physics of Soils	3		—	10
Prof. WICKSON.				
4A. General Course	3	3		8
4B. General Course	3		3	25
13. Seminary Course	1	1	1	7
14. Seminary Course	1	1	1	6
Asst. Prof. LOUGHRIDGE.				
1D. The Physics of Soils	2	4		4
17. Soil Areas and Soil Distribution in California	1		1	3
Asst. Prof. LOUGHRIDGE, with Prof. HILGARD.				
1A. General Course	3	3		10
1B. Chemistry and Physics of Soils	3		3	10
Asst. Prof. WOODWORTH.				
7A. Entomological Œcology (repeated second half-year)	2	2	2	69:61
7B. Entomological Laboratory (repeated second half-year)	2	6L	6L	7:10
7C. Elementary Entomology	1	1		22
7D. Economic Entomology	1		1	36
8. Apiculture	1		1	16
11A. Systematic Entomology	3		3	15
12. Entomological Laboratory	12	9L	9L	1
23. Entomological Seminary	1		1	3
Asst. Prof. WOODWORTH and Instructor BIOLETTI.				
9. Parasitic Plant Diseases	2	2		9
Asst. Prof. JAFFA.				
3A. Foods and Feeding	1		1	3
3B. Principles of Nutrition	1	1		11
3C. Composition and use of Human Foods: Food Adulteration	1		1	25
3D. Laboratory Course	2	6		2
3E. Special Researches in Animal Nutrition	3		7	1
4C. Chemistry of Dairy Products	1	1		4
Asst. Prof. JAFFA and Instructor COLBY.				
3. Laboratory of Agricultural Chemistry	4 or 5	15L	15L	7
Asst. Prof. HAYNE (second half-year): Farmers' Institute work.				
Instructor COLBY.				
2A. Analysis of Must and Wine	3	1, 6L		1

Statement of Instruction and Attendance—(*Continued*).

Instructor, and Course	Units	Instructor's Hours		Students
		First Half	Second Half	
Instructor Colby, with Asst. Prof. Jaffa.				
3. Laboratory of Agricultural Chemistry	4 or 5	15L	15L	7
Instructor Bioletti.				
5B. Olive Culture	1		1	5
5D. Viticulture	2		2	7
9A. Bacteria	1		1	45
9B. Elementary Bacteriological Laboratory	2		6L	10
9C. Zymology	3	1, 6L		2
10A. Bacteriological Analysis (repeated second half-year)	3	9L	9L	1:1
Instructor Bioletti, with Assistant Professor Woodworth.				
9. Parasitic Plant Diseases	2	2		9
Assistant dal Piaz.				
2. Vinification	1	1		4
2C. Manufacture of Unfermented Grape Juice, Sweet Wines, Champagne, etc.	1		1	2
Assistant Snow (second half-year) and Honorary Fellow Rimbach (second half-year).				
MILITARY SCIENCE AND TACTICS.				
Prof. Soulé. (See also *Civil Engineering*.)				
1. Practical Course	1	2L	2L	610
2A. Theoretical Course	1	1		117
2B. Theoretical Course	1		1	114
PHYSICAL CULTURE.				
Asst. Prof. Magee.				
4. History of Physical Culture		2		2
5. Anthropometry			1	1
6. Exercises Adapted to Public Schools		1	1	2
8. Physiology of Exercise			1	7
Asst. Prof. Magee and Assistant Reinhardt.				
1. Elementary Course (2 sections)		6L		293
2. Advanced Course (2 sections)		6L		182
Asst. Prof. Magee and Assistant Mrs. Magee.				
3. Course for Young Women (3 sections)		6L		167
Prof. D'Ancona.				
11. Human Anatomy and Demonstrations		1	1	2
Assistant Mrs. Magee, with Asst. Prof. Magee.				
3. Course for Young Women (3 sections)		6L		167
Assistant Reinhardt, with Asst. Prof. Magee.				
1. Elementary Course (2 sections)		6L		293
2. Advanced Course (2 sections)		6L		182

TABLE 2.—Statement of instruction and attendance in the Summer Session, 1899.

INSTRUCTOR.	COURSE.	HOURS.	NO. OF STUDENTS.
Asst. Prof. Dresslar	Introduction to Pedagogy	5	18
Instr. Babcock	American History	5	17
Instr. Babcock	Mediæval Europe	5	5
Instr. Noble	Advanced Algebra	5	9
Instr. Noble	Plane Analytic Geometry	5	12
Instr. Boynton	Physics	Lab.	66
Reader Beattie	Chemistry	Lab.	57

Total number of students, 161.

TABLE 3.—Statement of instruction and attendance in the Summer Session, 1900.

INSTRUCTOR.	COURSE.	CREDIT VALUE.	NO. OF STUDENTS.
	PHILOSOPHY.		
Instr. Montague	1. Introduction to Study of Metaphysics	2	27
	PEDAGOGY.		
Prof. E. C. Sanford	1. Principles of Psychology, with Special Reference to the Mind of the Child	1	64
Asst. Prof. Dresslar	2. School Hygiene	2	58
President Burk	3. The Development of the Nervous System in Relation to the Problems of Education	1	84
President Van Liew	4. The Pedagogy of Child Study	1	58
	HISTORY.		
Prof. Bacon	1. Government of the United States	2	49
Prof. Bacon	2. The Renaissance	2	29
Assoc. Prof. Duniway	3. History of England since 1843	2	47
Asst. Prof. Babcock	4. History of the United States since 1850	2	37
Asst. Prof. Babcock	5. Mediæval Life and Institutions	2	28
Assoc. Prof. Duniway	6. The American Revolution	1	40
	SEMITIC.		
Assoc. Prof. Margolis	1. Elementary Hebrew	2	2
Assoc. Prof. Margolis	3. Introductory Course in Aramaic and Syriac	1	1
Assoc. Prof. Margolis	4. Arabic	1	1
	GREEK.		
Instr. Allen	1. Elementary Greek	Matric.	11

INSTRUCTOR.	COURSE.	CREDIT VALUE.	NO. OF STUDENTS.
	LATIN.		
Instr. Hopkins	1. Virgil's Æneid	Matric.	28
Instr. Hopkins	2. Cicero's Orations	Matric.	24
Instr. Hopkins	3. Roman Satire	1	10
	ENGLISH.		
Instr. Hart	1. Elementary Old English	2	13
Asst. Prof. Armes	2. Outline of English Literature—The Beowulf to Milton	2	40
Instr. Hart	3. Outline of English Literature—Milton to Wordsworth	2	28
Asst. Prof. Armes	4. History of American Literature	2	67
	MATHEMATICS.		
Instr. Pierce	1. Introduction to Plane Analytic Geometry	2	21
Instr. Pierce	2. Modern Synthetic Geometry	2	5
Instr. Pierce	3. Elements of Differential and Integral Calculus	2	9
	PHYSICS.		
Instr. Drew, Assts. Hall and Sheldon	1. Introductory Physics	Matric.	52
	2. (Equivalent to the laboratory work of the Freshman course)		26
	3. (Equivalent to the laboratory course for Sophomores	4	15
	4. Lectures, with experimental illustration, on Electricity and Magnetism		10
	CHEMISTRY.		
Assoc. Prof. O'Neill, Instr. Booth, Assts. Pearce, Collins, Christensen, and Laist	1. Introductory Chemistry	Matric.	52
	2. Qualitative Analysis	2	16
	3. Quantitative Analysis—Gravimetric	3	18
	4. Organic Chemistry	2	13
	BOTANY.		
Instr. Osterhout	1. Introduction to Plant Physiology and Morphology	2	38
Instr. Osterhout	2. The Living Plant and its Environment	1	44

No. of Courses offered, 37. No. of Courses given, 35.

TABLE 4.—Summary of officers and students in the Summer Session, 1900.

Officers of instruction, including assistants		25
University of California	20	
Leland Stanford Junior University	1	
Clark University	1	
Chico State Normal School	1	
San Francisco State Normal School	1	
Ventura High School	1	
Students (total)		433
Students graduates of a college or university		90
(*a*) University of California	35	
(*b*) Other colleges or universities	55	
Students also enrolled during regular college sessions		147
(*a*) University of California	120	
(*b*) Leland Stanford Junior University	22	
(*c*) Other colleges or universities	5	
Teachers enrolled as students		239
(*a*) College graduates	70	
(*b*) Not college graduates	169	
Students under twenty-one years of age		74
Apparently preparatory students		37
Students who took examinations		254
Students who passed in one or more		229

TABLE 5.—Summaries of officers of instruction.

IN THE COLLEGES AT BERKELEY, 1890–1900.

YEAR	Professors	Associate Professors	Assistant Professors	Lecturers	Instructors	Assistants	Fellows	Totals
1890-91	17	5	5	2	8	11	0	48
1891–92	17	8	8	0	13	12	2	60
1892–93	16	9	10	1	19	18	4	77
1893–94	17	9	12	0	20	23	7	88
1894–95	21	9	12	0	24	17	7	90
1895–96	21	10	13	0	26	18	6	94
1896–97	22	10	18	0	21	28	8	107
1897–98	25	8	25	2	35	26	6	127
1898–99	31	14	19	1	40	36	0	141
1899–1900	31	15	20	2	40	40	5	153

IN THE COLLEGES IN SAN FRANCISCO, 1894—1900.

YEAR	Art	Law	Medicine	P. G. Medicine	Dentistry	Pharmacy	Veterinary
1894–95	6	3	38	50	37	11	12
1895–96	5	4	51	46	36	11	13
1896–97	6	5	84	54	37	14	15
1897–98	6	6	49	51	41	10	10
1898–99	6	5	68	58	43	7	14
1899–1900	8	5	70	82	45	10	12

In the LICK ASTRONOMICAL DEPARTMENT, at Mt. Hamilton, the number of Officers of Instruction has been as follows: 1894–95, 7; 1895–96, 7; 1896–97, 8; 1897–98, 10; 1898–99, 11; 1899–1900, 11.

TABLE 6.—Students in the several colleges, 1889–90 and 1893–1900.

NOTE.—The upper figures on the left of each group refer to men, the lower to women; the figures on the right side are the totals.

In Berkeley:	COLLEGES.	1889–90	1893–94	1894–95	1895–96	1896–97	1897–98	1898–99	1899–1900
Graduate Students:		15 6 21	43 21 64	60 40 100	73 45 118	75 46 121	99 75 174	103 91 194	118 100 218
Undergraduates:	Letters	....	60 33 93	73 40 113	71 53 124	83 69 152	91 104 195	96 120 216	114 152 266
	Social Sciences	....	204 193 397	288 267 555	334 366 700	332 407 739	299 452 751	264 484 748	260 566 826
	Natural Sciences	....	21 13 34	24 24 48	39 40 79	42 55 97	60 59 119	61 59 120	67 74 141
	Commerce	....	....	....	....	....	....	3 0 3	20 1 21
	Agriculture	....	13 4 17	14 3 17	11 4 15	19 2 21	28 4 32	17 4 21	24 7 31
	Mechanics	....	82 2 84	102 6 108	120 8 128	130 6 136	133 0 133	127 0 127	144 0 144
	Mining	....	32 0 32	39 0 39	60 0 60	110 0 110	156 0 156	170 0 170	191 0 191
	Civil Engineering	....	57 1 58	73 10 83	54 2 56	48 3 51	39 0 39	40 0 40	50 0 50
	Chemistry	....	29 9 38	52 9 61	49 7 56	62 9 71	63 11 74	75 12 87	94 19 113
	Total Undergraduates	294 86 380	498 255 753	665 359 1024	738 480 1218	827 550 1377	869 630 1499	853 679 1532	964 819 1783
Total in the Colleges at Berkeley (deducting for duplicates)		309 92 401	541 274 815	725 399 1124	811 525 1336	902 596 1498	963 702 1665	953 763 1717	1077 910 1987

Lick Observatory, at Mt. Hamilton	...		5 2	7	6 2	8	3 0	3	1 0	1	2 0	2	5 0	5	2 0	2
In San Francisco:																
Mark Hopkins Institute of Art	...		21 70	91	31 51	82	30 77	107	62 105	167	101 121	222	98 108	206	87 84	171
Hastings College of the Law	... ...	76	126 1	127	151 2	153	161 0	161	148 4	152	134 7	141	129 3	132	102 4	106
Medical Department	... ...	97	87 13	100	120 14	134	96 16	112	95 15	110	106 17	123	124 22	146	133 20	153
Post-Graduate Medical Department	...		10 1	11	7 1	8	3 4	7	18 4	22	9 0	9	5 1	6	8 0	8
Dental Department	... ...	50	135 7	142	160 8	168	192 13	205	155 11	166	147 11	158	152 9	161	144 5	149
California College of Pharmacy	... ...	77	95 0	95	107 3	110	105 9	114	88 7	95	67 4	71	65 3	68	77 5	82
Veterinary Department	...		...		...		11 0	11	8 0	8	7 0	7	5 0	5	2 0	2
Total in the Colleges in San Francisco	... ...	300	474 92	566	576 79	655	598 119	717	574 146	720	571 160	731	578 146	724	553 118	671
Total in the University (deducting for duplicates)	... ...	701	1016 367	1383	1301 480	1781	1403 644	2047	1471 742	2213	1531 860	2391	1531 908	2439	1629 1031	2660

TABLE 7.—Showing proportion (per cent.) of the undergraduates in each of the Colleges at Berkeley.

	1893–94.	1894–95.	1895–96.	1896–97.	1897–98.	1898–99.	1899–1900.
Letters	12.35	11.04	10.18	11.04	13.01	14.11	14.92
Social Sciences	52.72	54.20	57.47	53.67	50.10	48.86	46.32
Natural Sciences.	4.52	4.69	6.49	7.04	7.94	7.84	7.90
Commerce	....	....	....	....	....	0.20	1.17
Agriculture	2.24	1.66	1.23	1.53	2.13	1.37	1.73
Mechanics	11.16	10.54	10.51	9.88	8.87	8.29	8.08
Mining	4.25	3.80	4.93	7.98	10.41	11.04	10.71
Civil Engineering	7.70	8.11	4.59	3.70	2.60	2.61	2.80
Chemistry	5.06	5.96	4.60	5.15	4.94	5.68	6.37

TABLE 8.—Amount and classification of work elected by Graduate Students, 1899–1900.

DEPARTMENTS.	Total Number Students in the Department.	Total Units of Registration in the Department.	Average Registration per Student in the Department.
Philosophy	26	131	5.03
Education	60	334	5.56
Jurisprudence	6	90	15.00
History and Political Science	27	170	6.29
Semitic Languages	5	36	7.20
Oriental Languages	4	24	6.00
Greek	19	127	6.68
Latin	30	167.5	5.58
English	52	355	6.82
German	17	69	4.05
Romance Languages	24	122	5.08
Mathematics	22	104	4.72
Physics	16	86	5.37
Astronomy	9	66	7.33
Geography	0	0	0.00
Chemistry	26	156	6.00
Botany	12	62	5.16
Zoölogy	21	146	6.95
Geology	13	83.5	6.42
Mineralogy	7	23	3.28
Mechanical Engineering	6	34	5.66
Civil Engineering	7	29	4.14
Mining and Metallurgy	6	52	8.66
Drawing (inc. Art) and Engineering Design	8	29	3.62
Agriculture, etc.	6	22	3.66

Total Graduate Students, 218. Graduate Students who registered for specific courses, 209. Total units registered, 2,518. Total units completed, 1,898.5. Average registration per student, 12.04 units. Average credit, 9.08 units. Graduate Students who completed no specific course, 42. Graduate Students, registered 1899–1900, who have re-registered 1900–1901 (to October 20), 58.

Table 9.—Colleges and Universities represented in the Graduate Department, 1896–1900.

Name	No. of Students 1896–97	No. of Students 1897–98	No. of Students 1898–99	No. of Students 1899–1900
Add-Ran University	—	1	—	—
Amherst College	—	1	—	—
Amsterdam, University of	1	—	—	—
Bates College	1	1	2	2
Bethany College	1	1	1	—
Beloit College	—	1	1	—
Boston University	—	—	—	1
Brown University	2	2	2	1
California College	—	—	—	1
Carlton College	1	—	—	—
Chicago, University of	—	—	—	3
Copenhagen, University of	—	2	—	1
Colorado College	1	—	—	—
Columbia University	1	—	—	3
Cornell College	1	—	—	—
Cornell University	1	—	1	1
Dartmouth College	—	—	1	—
Davidson College	2	1	—	—
Dublin, University of	—	1	1	—
Elmira College	—	—	—	1
Emporia College	—	—	1	—
Georgia, University of	—	1	1	1
Griswold College	—	1	1	1
Guilford College	—	—	—	1
Haverford College	—	1	2	1
Harvard University	3	4	5	5
Heidelberg (Ohio) University	—	1	1	—
Idaho, University of	—	—	1	1
Illinois, University of	—	1	—	—
Illinois Wesleyan University	—	1	1	—
Indiana University	—	—	1	3
Iowa College	—	—	—	1
Iowa Wesleyan University	—	1	—	—
Johns Hopkins University	—	1	1	1
Kansas Agricultural College	—	1	2	1
Kansas, University of	—	2	1	—
Leland Stanford Jr. University	4	6	10	10
London School of Mines	—	1	1	—
La Grange College	—	1	—	—
Massachusetts Institute of Technology	—	1	—	—
Marietta College	1	—	1	—
McKendree College	1	1	—	—
Mills College	1	3	1	3
Minnesota, University of	—	1	1	3
Missouri, University of	1	—	—	1
Michigan, University of	4	—	2	2
Mount Holyoke College	—	—	—	1
Mount Union College	—	—	1	—
Muskingum College	1	1	1	—
Northern Illinois College	—	1	1	1
Nebraska, University of	—	1	—	—
Nebraska Wesleyan University	—	—	1	—
Nevada, University of	2	3	—	—

TABLE 9.—*(Continued.)*

NAME	No. of Students 1896–97	No. of Students 1897–98	No. of Students 1898–99	No. of Students 1899–1900
Northwestern University	—	1	1	1
Oberlin College	2	3	2	1
Occidental College	—	1	—	—
Ohio Wesleyan University	1	—	—	1
Oregon Agricultural College	—	2	—	—
Olivet College	—	—	1	—
Oregon, University of	—	—	—	1
Pacific College	—	—	—	1
Pacific, University of the	—	—	2	1
Paris, University of	—	—	—	1
Pennsylvania College	1	1	1	1
Penn College	—	2	1	—
Pomona College	4	7	8	7
Princeton University	1	—	—	1
Roanoke College	—	1	1	1
Rome, Gregorian University of	1	1	—	—
Smith College	1	1	—	—
Southern California, University of	—	1	1	4
South Carolina, University of	—	1	—	—
Southwestern Presb. University	1	1	1	—
St. John's College	1	—	—	—
St. Joseph's College	—	—	—	1
Tabor College	1	1	1	2
Toronto, University of	—	—	2	1
Vassar College	—	1	2	1
Vermont, University of	1	—	—	—
Virginia Military Institute	—	—	—	1
Washburn College	1	—	—	—
Washington, University of	1	—	—	1
Western Reserve University	—	1	1	—
Wellesley College	1	3	2	1
Wheaton College	—	—	—	1
Willamette University	1	1	1	—
Wisconsin, University of	—	—	1	—
Yale University	2	4	4	4
Total number of Colleges and Universities	35	50	47	47
Total number Graduate Students	119	174	194	218
Percentage of Graduate Students from University of California	63.0	59.0	61.9	65.3
Percentage from other institutions	37.0	41.0	38.1	34.7

TABLE 10.—Geographical classification, according to declared home residence, of students in the Academic Colleges.

California, by Counties:	UNDERGRADUATE STUDENTS: Regular, Limited, and Special (1894–96; 1897–1900)					1899–1900						Students in Summer Session, 1900	1900–1901	
						STUDENTS: all	Undergraduate Students		Graduate Students	Undergraduate Students: Intrants only			Undergraduate Students: Intrants only, to October 20	
	1894–95	1895–96	1897–98	1898–99	1899–00		Reg. and Lim.	Special		Reg. and Lim.	Special		Reg. and Lim.	Special
Alameda (in Berkeley, Oakland, Alameda)	407	465	579	603	702	809	538	164	112	140	67	143	129	48
Alameda (outside Berkeley, Oakland, Alameda)	20	32	43	61	38	51	34	4	13	5	4	7	11	4
Alpine		1	1											
Amador				1	1	1		1			1	1	1	
Butte	4	5	11	10	15	15	14	1		6		10	4	
Calaveras	2	1	3	2	3	3	2	1			1	3	1	
Colusa	4	4	6	4	5	5	5			1			1	1
Contra Costa	7	6	10	5	19	20	13	6	1	7	7	1	3	2
Del Norte				1										
El Dorado	1	2	2	2	2	3	2		1	1				
Fresno	14	17	12	18	18	20	18		3	7		16	9	1
Glenn	4	2	2	1		1			1			3	1	
Humboldt	2	2	9	11	24	24	19	5		11	3	3	13	2
Inyo														
Kern			2	4	4	4	4					1	4	1
Kings			3	5	6	6	6			2			5	
Lake	1	1	2	1								1	1	
Lassen				1										
Los Angeles	48	58	68	66	101	108	91	10	10	40	6	12	47	8
Madera	1	1										4		2
Marin	13	15	15	13	19	20	19		2	10		2	7	1
Mariposa			1	1										
Mendocino	1	2	6	15	11	11	11			1		2	5	1
Merced	2	2	2	5	6	6	5	1		5		4	5	

Modoc	1		1	1	1	1	1							
Mono														
Monterey	6	8	10	7	8	9	7	1	1	4	1	2	3	1
Napa	9	5	5	5	6	7	6		1	2		1	5	
Nevada	18	11	21	12	15	16	15		1	4		9	5	
Orange	9	9	18	14	17	18	16	1	1	4		5	5	
Placer	4	6	8	8	8	8	7	1		1	1	3	8	
Plumas				1										
Riverside	10	9	15	17	20	21	16	4	1	6	2	2	14	3
Sacramento	13	14	26	30	27	28	27		1	6	1	5	5	
San Benito	2	5	2	1	6	6	6			9		2		
San Bernardino	4	4	17	20	24	27	22	2	3	8	3	5	6	1
San Diego	7	6	18	30	32	33	29	3	1	11	1	4	18	3
San Francisco	252	313	328	283	322	359	279	43	41	102	32	59	96	15
San Joaquin	12	16	22	19	23	25	19	4	2	9	1	8	5	1
San Luis Obispo	11	10	13	16	14	14	13	1		5		2	5	1
San Mateo	2	2	2	2	1	1	1				1		1	
Santa Barbara	10	20	24	26	28	29	27	1	1	7		2	14	
Santa Clara	7	10	16	10	21	24	18	3	3	12	3	25	9	2
Santa Cruz	14	20	24	24	25	26	20	5	1	7	2	6	11	
Shasta		5	1		3	3	3			1	1		2	
Sierra	2	2	1	1										
Siskiyou	2	5	7	7	5	5	4	1			1	1	2	1
Solano	12	13	11	18	13	15	12	1	2	3		4	9	1
Sonoma	24	27	33	38	41	42	38	3	1	6	3	30	8	
Stanislaus	1	2	2	6	11	11	9	2		7	1	6	11	
Sutter			1	1	2	2	2			1		1	1	
Tehama		1	3	3	2	2	2			1	1	3	5	
Trinity	1	1	1									1	1	
Tulare	2	3	15	17	26	27	24	2	1	10		9	12	
Tuolumne	1		1										6	
Ventura	4	11	10	10	16	17	15	1	1	7	1	4		
Yolo	9	10	19	15	26	26	25	1		12	2	2	8	3
Yuba	3	3	5	5	5	5	5	0		2		1		
Totals	983	1167	1457	1481	1722	1914	1449	273	206	483	147	415	523	103

GEOGRAPHICAL CLASSIFICATION OF STUDENTS—(*Continued*).

Other States and Countries:	Undergraduate Students: Regular, Limited, and Special (1894–96; 1897–1900)					1899–1900						Students in Summer Session, 1900	1900–1901	
						Students: all	Undergraduate Students		Graduate Students	Undergraduate Students: Intrants only			Undergraduate Students: Intrants only, to October 20	
	1894–95	1895–96	1897–98	1898–99	1899–00		Reg. and Lim.	Special		Reg. and Lim.	Special		Reg. and Lim.	Special
Africa		1	1	2						1				
Alaska	1	1			1	1	1							
Arizona		1	2	4	3	4	1	2	1		2	6	1	
Armenia										1				
Australia				1	2	2	1	1		1	1			
Canada				1	2	3	1	1	1	1			1	1
China		1												
Columbia	1													
Colorado	1	1		4	2	2	2					1	3	1
District of Columbia					1	1	1			1				1
England	1	1		1						1	1			
Georgia						1			1					
Hawaii	1	2	2	1	3	4	3		1	2			2	1
Idaho						1			1	1		2	1	
Illinois	3	4	1	2	2	2	2			2			2	4
Indiana		1	2										2	
Indian Territory											1			
Iowa			1	3	4	4	2	2		1	2	1		
Ireland				1	1	1	1							
Japan	9	10	7	5	6	6	3	3		1	1			3
Kansas	2										1			
Kentucky			2											
Massachusetts					1	2		1	1	1	1			1
Mexico		1	1	1		1			1	1				
Michigan				1	2	3	2		1	1			2	1
Minnesota													1	

Missouri				1	1	1		1			1		1	
Montana			1	2	1	1	1					1	4	
Nebraska			1								1			1
Nevada	5	4	1	1								1	1	
New Jersey			1	1										
New York	1	1	1	1	1	1	1			2		1	4	3
North Dakota										1				
Ohio			1		2	3	1	1	1	1		1	3	1
Oregon	3	2	6	9	12	14	9	3	2	5	2	2	8	3
Pennsylvania					1	1	1						1	1
Russia			1											
Scotland		1	1							1				
South Dakota														1
Tennessee														1
Texas										2				
Utah	1	4	2	1	2	2	2			1			1	
Vermont	1					1			1					
Virginia					1	1	1				1			
Washington	3	5	6	7	10	10	9	1		2	2	1	4	1
Wisconsin		1										1		
Totals	33	42	42	50	61	73	45	16	12	31	17	18	42	24
Not accounted for	5	9												
Totals (complete)	1024	1218	1499	1531	1783	1987[1]	1494	289	218	514	164	433	565	127

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[1] Deducting 14 for duplicates,

TABLE 12.—Degrees conferred, 1894–1900.

NOTE.—The statistics are, in each year except 1900, for the calendar year—January to December inclusive. For 1900 they are given to November 1st only.

	DEGREE	1894		1895		1896		1897		1898		1899		1900	
	LL.D.	0		0		0		0		1		0		0	
		0	0	0	0	0	0	0	0	0	1	0	0	0	0
	Ph.D.	2		0		3		1		1		2		1	
		0	2	0	0	0	3	0	1	0	1	0	2	1	2
	M.A.	4		2		5		0		4		4		3	
		1	5	1	3	1	6	3	3	4	8	3	7	2	5
	M.L.	0		2		1		0		0		0		1	
		0	0	2	4	4	5	2	2	2	2	6	6	3	4
	M.S.	2		0		5		1		7		5		5	
		0	2	0	0	1	6	0	1	2	9	3	8	1	6
	Number of higher degrees	8		4		14		2		13		11		10	
		1	9	3	7	6	20	5	7	8	21	12	23	7	17
	A.B.	13		14		13		10		15		14		19	
		5	18	8	22	5	18	11	21	15	30	21	35	21	40
	B.L.	15		15		10		8		18		18		34	
		14	29	18	33	23	33	42	50	30	48	30	48	48	82
	Ph.B.	10		16		25		37		29		28		4	
		14	24	6	22	13	38	22	59	24	53	27	55	7	11
B.S.	Nat. Sciences	1		4		7		9		10		9		8	
		1	2	3	7	5	12	5	14	7	17	10	19	14	22
	Commerce											0		3	
		……	……	……	……	……	……	……	……	……	……	0	0	0	3
	Agriculture	3		0		2		2		1		4		3	
		0	3	0	0	0	2	0	2	0	1	0	4	0	3
	Mechanics	4		7		11		10		20		20		18	
		0	4	0	7	0	11	0	10	0	20	0	20	0	18
	Mining	3		4		1		5		7		17		24	
		0	3	0	4	0	1	0	5	0	7	0	17	0	24
	Civil Eng.	10		6		10		6		9		2		5	
		1	11	0	6	0	10	0	6	0	9	0	2	0	5
	Chemistry	1		7		8		5		4		6		3	
		0	1	1	8	1	9	1	6	1	5	0	6	10	13
	Number of bachelor's degrees	60		73		87		92		113		118		121	
		35	95	36	109	47	134	81	173	77	190	88	206	100	221
	LL.B.	37		33		47		36		33		41		22	
		0	37	2	35	0	47	0	36	3	36	1	42	0	22
	M.D.	28		24		44		6		18		25		23	
		3	31	2	26	7	51	2	8	2	20	3	28	7	30
	D.D.S.	18		38		47		38		40		42		42	
		0	18	0	38	5	52	5	43	5	45	4	46	3	45
	Ph.G.	21		25		26		17		35		17		33	
		1	22	0	25	0	26	1	18	2	37	1	18	2	35
	D.V.S.					0		3		4		2		0	
		……	……	……	……	0	0	0	3	0	4	0	2	0	0
	Number professional degrees.	104		120		164		100		130		127		120	
		4	108	4	124	12	176	8	108	12	142	9	136	12	132

TABLE 11.—Students of the Academic Colleges resident in California, 1894–95 and 1899–1900, classified according to declared home residence in certain divisions of the State, and compared with the population, the taxable property, and the seniors in accredited public high schools in those divisions.

ACADEMIC YEAR 1894-1895

	UNDERGRADUATE STUDENTS				GRADUATE STUDENTS		STUDENTS all		INTRANTS: Reg. and Lim.		POPULATION (estimated)		Seniors in Accredited Public High Schools		TAXABLE PROPERTY	
	Reg. and Lim.		Special													
	No.	Per cent	No.	Per cent	No.	Per cent	No.	Per cent	No.	Per cent	No.	Per cent.	No.	Per cent	AMOUNT	Per cent.
First Congressional District: The counties of Del Norte, Siskiyou, Modoc, Humboldt, Trinity, Shasta, Lassen, Tehama, Plumas, Sierra, Mendocino, Sonoma, Napa, and Marin.	45	5.3	10	7.0	0	0.0	55	5.1	23	6.6	175,764	13.0	52	5.1	$118,456,652	10.4
Second Congressional District: The counties of Butte, Sutter, Yuba, Nevada, Placer, El Dorado, Amador, Calaveras, Mono, Inyo, Alpine, Tuolumne, Mariposa, San Joaquin, and Sacramento.	51	6.0	7	4.9	6	6.0	64	5.9	16	4.6	189,902	14.1	120	11.9	129,698,884	11.4
Third Congressional District: The counties of Colusa, Glenn, Yolo, Lake, Solano, Contra Costa, and Alameda.	386	45.8	78	54.9	61	61.0	525	48.5	141	40.8	183,855	13.6	255	25.4	167,531,068	14.8
Fourth and Fifth Congressional Districts: The counties of San Francisco, San Mateo, and Santa Clara.	224	26.6	37	26.0	23	23.0	284	26.2	98	28.4	386,090	28.6	297	29.6	402,701,703	35.5
Sixth Congressional District: The counties of Santa Cruz, Monterey, San Luis Obispo, Santa Barbara, Ventura, and Los Angeles.	85	10.1	8	5.6	9	9.0	102	9.4	38	11.0	221,193	16.4	165	16.4	148,444,949	13.1
Seventh Congressional District: The counties of Stanislaus, Madera, Merced, San Benito, Fresno, Tulare, Kings, Kern, San Bernardino, Riverside, Orange, and San Diego.	50	5.9	2	1.4	1	1.0	53	4.9	29	8.4	189,955	14.1	113	11.2	166,448,757	14.7
Alameda County: In Oakland, Alameda, and Berkeley.	335	39.8	72	50.7	57	57.0	464	42.8	119	34.4	80,793	5.9	220	21.9	63,645,001	5.6
Alameda County: Outside of Oakland, Alameda, and Berkeley.	18	2.1	2	1.4	4	4.0	24	2.2	5	1.4	31,234	2.3	20	1.9	30,659,496	2.7
San Francisco.	216	25.6	36	25.3	21	21.0	273	25.2	93	26.9	298,997	22.2	249	24.8	328,072,108	28.9
San Francisco, Oakland, Alameda, and Berkeley.	551	65.5	108	76.0	78	78.0	737	68.0	212	61.4	401,662	29.8	469	46.8	391,717,109	34.6
The Southern Counties: Los Angeles, San Diego, Santa Barbara, Ventura, San Bernardino, Riverside, Orange.	85	10.1	7	4.9	8	8.0	100	9.2	49	14.1	201,382	14.9	183	18.2	168,776,428	14.9
Totals, deducting for duplicates.	841		142		100		1083		345		1,346,759		1002		$1,133,282,013	

ACADEMIC YEAR 1899-1900

	UNDERGRADUATE STUDENTS				GRADUATE STUDENTS		STUDENTS: all		INTRANTS: Reg. and Lim.		POPULATION		Seniors in Accredited Public High Schools		TAXABLE PROPERTY	
	Reg. and Lim.		Special													
	No.	Per cent	No.	Per cent.	No.	Per cent	No.	Per cent.	No.	Per cent	No.	Per cent	No.	Per cent.	AMOUNT	Per cent
First Congressional District: The counties of Del Norte, Siskiyou, Modoc, Humboldt, Trinity, Shasta, Lassen, Tehama, Plumas, Sierra, Mendocino, Sonoma, Napa, and Marin.	103	7.1	9	3.2	4	1.9	116	6.0	32	6.6	188,512	12.6	131	7.6	$118,866,550	9.7
Second Congressional District: The counties of Butte, Sutter, Yuba, Nevada, Placer, El Dorado, Amador, Calaveras, Mono, Inyo, Alpine, Tuolumne, Mariposa, San Joaquin, and Sacramento.	87	5.3	12	4.3	5	2.4	104	5.4	30	6.1	200,806	13.5	113	6.5	132,959,581	10.9
Third Congressional District: The counties of Colusa, Glenn, Yolo, Lake, Solano, Contra Costa, and Alameda.	627	43.2	176	64.4	129	62.6	932	48.3	168	34.7	204,960	13.7	315	18.3	162,650,190	13.3
Fourth and Fifth Congressional Districts: The counties of San Francisco, San Mateo, and Santa Clara.	298	20.5	46	16.8	44	21.3	388	20.1	114	23.6	415,092	27.9	429	25.0	476,818,127	39.1
Sixth Congressional District: The counties of Santa Cruz, Monterey, San Luis Obispo, Santa Barbara, Ventura, and Los Angeles.	173	11.9	19	6.9	15	7.2	207	10.7	70	14.4	261,128	17.5	388	22.6	162,932,979	13.3
Seventh Congressional District: The counties of Stanislaus, Madera, Merced, San Benito, Fresno, Tulare, Kings, Kern, San Bernardino, Riverside, Orange, and San Diego.	161	11.1	11	4.3	9	4.3	181	9.4	69	14.2	214,892	14.4	340	19.8	164,065,030	13.4
Alameda County: In Oakland, Alameda, and Berkeley.	538	37.1	164	60.0	112	54.3	814	42.2	140	28.9	96,638	6.5	216	12.5	62,564,683	5.1
Alameda County: Outside of Oakland, Alameda, and Berkeley.	34	2.3	4	1.4	13	6.3	51	2.6	5	1.0	33,552	2.2	12	.7	24,358,077	1.9
San Francisco.	279	19.2	43	15.7	41	19.9	363	18.8	102	21.1	342,782	23.0	318	18.5	410,425,849	33.6
San Francisco, Oakland, Alameda, and Berkeley.	817	56.3	207	75.8	153	74.2	1177	61.0	242	50.1	439,420	29.5	534	31.1	472,990,532	38.8
The Southern Counties: Los Angeles, San Diego, Santa Barbara, Ventura, San Bernardino, Riverside, Orange.	216	14.9	22	8.0	18	8.7	256	13.3	83	17.1	304,211	20.4	481	28.0	181,259,357	14.8
Totals, deducting for duplicates.	1449		273		206		1928		483		1,485,390		1716		$1,218,292,457	

TABLE 13.—Average age, at graduation, of recipients of the bachelor's degree in the Undergraduate Department.

	1890	1891	1892	1893	1894	1895	1896	1897	1898	1899	*1900
No. of graduates	47	54	59	70	95	109	133	157	218	196	195
No. over 30 years of age	0	0	0	1	3	7	3	4	8	12	8
No. over 25 years of age	1	6	12	10	14	17	9	31	26	39	38
Average age	21.90	22.40	23.32	23.08	23.51	23.54	22.74	23.18	22.73	24.89	†22.31

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*December graduates not included.

†Average for 1900, omitting graduates over 30 years of age, 21.76.

TABLE 14.—Number of accredited schools, each year, since the first accrediting of schools, in 1883–84.

	1883–84	1884–85	1885–86	1886–87	1887–88	1888–89	1889–90	1890–91	1891–92	1892–93	1893–94	1894–95	1895–96	1896–97	1897–98	1898–99	1899–1900
No. public high schools accredited	3	4	6	6	6	7	11	17	24	30	39	43	52	61	66	76	87
No. private secondary schools accredited	0	0	0	0	1	2	2	6	7	10	9	14	15	15	16	15	23
Total number schools accredited	3	4	6	6	7	9	13	23	31	40	48	57	67	76	82	91	110

TABLE 15.—Student Registration, 1899–1900, by departments; with approximate cost per unit of registration in each of the departments.

NOTE.—A *unit of registration* is one hour of a student's time at the University weekly, during one half-year, in lecture or in recitation, together with the time necessary in preparation therefor; or, a longer time in laboratory or other exercises not requiring preparation. Credit for 125 units is necessary for a degree. A year's work is, therefore, normally 31¼ units.—The figures in the column headed *Cost* are grouped to show *(a)* salaries, *(b)* other expenses, not including those for administration, or library, or permanent improvements, *(c)* totals; where one amount only is given, the amount is for salaries alone.—Other figures show the *relative rank* of the departments in number of units of registration, and in cost per unit, from (1) the highest number, or the highest cost, to (28) the lowest.

DEPARTMENT	UNITS OF REGISTRATION		COST	COST PER UNIT OF REGISTRATION		REMARKS
	Number	Relative Rank of Department	(Salaries and other Department Expenses)	Cost per Unit.	Relative Rank of Department	
Philosophy	1488	10	$8,599.92 83.98 8,683.90	$5.83	12	Amount for salaries includes $5799.96 from D. O. Mills Endowment. Does not include Traveling Fellowship. If salary of one professor, on leave, 1899–1900, were deducted, cost per unit would be $3.14.
Education	1763	9	7,699.92 50.00 7,749.92	4.39	16	
Jurisprudence	1244	13	4,530.00	3.64	18	Includes the work of one honorary instructor, without compensation (64 units of registra'n).
History and Political Science	4130	3	11,799.96	2.86	22	
Semitic Languages	132	27	2,400.00	18.18	2	Includes the work of one honorary professor, without compensation (60 units of registration).
Oriental Languages	250	26	3,000.00	12.00	5	Edward Tompkins Endowment.
Greek	1201	15	5,936.37 30.00 5,966.37	4.97	14	

STUDENT REGISTRATION, 1899–1900—*(Continued)*.

Department	Units of Registration		Cost	Cost per Unit of Registration		Remarks
	Number	Relative Rank of Department	(Salaries and other Department Expenses)	Cost per Unit	Relative Rank of Department	
Latin	3322	8	$9,213.44 28.62 9,242.06	$2.78	23	
English	6285	1	15,199.92	2.42	24	If half-salary of one professor, who gave full time during second half-year to school inspection, were deducted, cost per unit would be $2.20.
German	3721	5	7,219.92	1.94	27	If salary of one professor, on leave, 1899–1900, were deducted, cost per unit would be $1.13.
Romanic Languages	3451	7	7,200.00	2.09	26	
Dec. Art and Free-hand Drawing	796	21	3,000.00	3.77	17	Amount for salaries includes $1050 from Morrill College Aid Fund.
Mathematics	5990	2	14,000.00 120.36 14,120.36	2.36	25	If salary of one professor, on leave, 1899–1900, were deducted, cost per unit would be $1.81.
Physics	3944	4	11,999.76 1,315.96 13,315.72	3.38	20–21	Amount for salaries includes $1200 from Morrill College Aid Fund. Does not include Whiting Fellowship. If net income ($1797.05) from students' laboratory fees were deducted, cost per unit would be $2.92.
Astronomy	582	24	3,900.00 419.15 4,319.15	7.42	8	
Geography	105	28	3,999.96 80.26 4,080.22	38.86	1	

STUDENT REGISTRATION, 1899–1900—*(Continued).*

DEPARTMENT	UNITS OF REGISTRATION		COST	COST PER UNIT OF REGISTRATION		REMARKS
	Number	Relative Rank of Department	(Salaries and other Department Expenses)	Cost per Unit	Relative Rank of Department	
Chemistry	3708	6	11,213.39 6,446.37 17,659.76	4.76	15	Amount for salaries includes $2160 from Morrill College Aid Fund. If net income ($4630.52) from students' laboratory fees were deducted, cost per unit would be $3.78.
Botany	1382	11	$8,234.35 339.49 8,573.84	$6.20	11	Amount for salaries includes $3734.35 from Morrill College Aid Fund.
Zoölogy	1019	16	6,599.88 427.58 7,027.46	6.89	10	If net income ($84.65) from students' laboratory fees were deducted, cost per unit would be $6.81.
Geology	744	23	5,247.06 204.43 5,451.49	7.33	9	Apportionment of cost (salaries and other expenses), with close approximation, as between the departments of Geology and Mineralogy, is not possible.
Mineralogy	534	25	2,152.94 556.23 2,709.17	5.07	13	Mineralogy.—If net income ($195.50) from students' laboratory fees were deducted, cost per unit would be $4.69.
Mechanics	964	17	12,207.02 3,989.07 16,196.09	16.80	3	Amount for salaries includes $4262.95 from Morrill College Aid Fund.
Civil Engineering (including summer course)	1232	14	8,822.23 972.42 9,794.65	7.95	7	If net income ($349.50) from students' laboratory fees were deducted, cost per unit would be $7.66.
Mining	786	22	7,600.00 1,958.54 9,558.54	12.16	4	Amount for salaries includes $3700 from Morrill College Aid Fund. If net income ($664.80) from students' laboratory fees were deducted, cost per unit would be $11.31.

STUDENT REGISTRATION, 1899–1900—*(Continued)*.

DEPARTMENT	UNITS OF REGISTRATION		COST	COST PER UNIT OF REGISTRATION		REMARKS
	Number	Relative Rank of Department	(Salaries and other Department Expenses)	Cost per Unit	Relative Rank of Department	
Agriculture	819	20	$9,467.00	$11.55	6	The amount for salaries here given is the amount that may be said to have been available by the department for the purposes of instruction in the Colleges at Berkeley during 1899 – 1900. Laboratory expenses are not given, since these are not separable from the expenses attendant upon the work of the Experiment Stations. The department's receipts from the Morrill College Aid Fund were $7049.88; from the Agricultural Experiment Station Fund, $7184.96. The total expenditures of the department, including the five Experiment Stations, the Farmers' Institutes, and the special work in Forestry and Viticulture were $42,798.01.
Instrumental Drawing	914	18	3,192.86	3.38	20–21	Amount for salaries includes $1842.86 from Morrill College Aid Fund.
Military Science	841	19	600.00 331.26 931.26	1.11	28	
Physical Culture	1304	12	4,085.92 499.83 4,585.75	3.52	19	If net income ($510) from students' locker rent were deducted, cost per unit would be $3.13. The computation is on the basis of a full year's work. Instruction during the second half was suspended on account of repairs and alterations in the building.

Average number of units of registration in a department, 1880.39.
Average cost per unit, $7.27.

FINANCIAL STATEMENT.

The following is a statement of expenditures and receipts of the State University Fund raised by the two-cent tax as directed in an Act of the Legislature of the State of California, entitled "An Act to provide for the permanent support and improvement of the University of California, by the levy of a rate of taxation, and the creation of a fund therefor," approved February 14, 1887; and "An Act to provide additional support and maintenance and for the acquisition of necessary property and improvements for the University of California by the levy of a rate of taxation, and the creation of a fund therefor,'' approved February 27, 1897. Statements showing these expenditures in detail are given in the annual report of the Secretary of the Board of Regents for the years mentioned.

For the Fiscal Year Ending June 30, 1899.

Receipts.

1899.	
January 1—Cash on Controller's warrant	$155,090 60
June 30—Cash on Controller's warrant	65,000 04
	$220,090 64

Expenditures.

Administration—	
Salaries	$36,689 13
Fuel	2,185 70
Equipment	1,076 73
Repairs	5,463 83
Advertising and Printing	35 80
Telegraphing and Expressage	817 24
Stationery	279 95
Postage	771 45
Examination of Schools	1,584 06
Traveling, etc	5,073 21
Light and Power	2,904 01
Water	2,592 93
Diplomas	600 75
Insurance	80 00
Department of—	
Astronomy	3,991 36
Botany	4,733 50
Chemistry	16,357 20
Civil Engineering	8,508 67
Decorative and Industrial Art	2,442 02
English	14,800 51
Geology	5,080 61
German	7,219 92
Greek	6,115 59
History and Political Science	12,201 99
Jurisprudence	4,500 00
Latin	8,900 78
Mathematics	7,247 71
Mechanical Drawing	2,813 33
Permanent Improvements	43,891 92
Reserved for Permanent Improvements	11,130 74
	$220,090 64

For the Fiscal Year Ending June 30, 1900.

Receipts.

1900.	
February 28—Cash on Controller's warrant	$166,641 18
June 30—Cash on Controller's warrant	69,657 10
	$236,298 28

Expenditures.

Administration—	
Salaries	$38,713 02
Fuel	2,225 60
Equipment	3,206 16
Repairs	2,026 30
Telegraphing and Expressage	958 16
Stationery	260 43
Postage	1,099 60
Examination of Schools	2,019 60
Expenses	5,687 21
Light and Power	5,703 30
Water	2,766 02
Installing Alaskan Museum	812 08
Mechanics' Fair	255 68
Inauguration Exercises	1,500 80
Department of—	
Astronomy	4,854 30
Botany	4,839 49
Chemistry	15,499 76
Civil Engineering	11,894 65
English	15,199 92
Geology	4,604 47
German	7,219 92
Greek	5,701 48
History and Political Science	11,799 96
Jurisprudence	4,530 00
Latin	9,506 94
Mathematics	14,120 13
Physical Culture	218 73
Permanent Improvements	24,624 24
Reserved for Permanent Improvements	34,450 33
	$236,298 28

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